http://www.oldgamesitalia.net/

COMMODORE WORLD

Issue 18
December 1996/January 1997
$4.95 U.S.

THE NEWS MAGAZINE FOR COMMODORE 64 & 128 USERS

Commodore Drives
The early years

- SuperCPU and Common Applications
- SuperCPU and GEOS

Apple Perspective:
Do Chickens Eat Apples?

Searching the Internet

Plus...
SuperCPU Update:
The latest info on the SuperCPU 128

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

COMMODORE RT on Genie

JOIN THE COMMODORE ON-LINE FAMILY

Internet Access

- Join the Internet revolution! Access the World Wide Web through Genie's LYNX browser
- Send and receive E–mail to/from Genie and Internet addresses
- Genie's Internet gateway requires no special hardware or software! Supports baud rates from 300 to 14,400

Basic Genie Services

- Access to other Round Tables (RT's)
- Access to hotel, rental car, airline reservations, etc.
- Grolier's on–line encyclopedia
- Genie User's (GENIEus) Bulletin Board
- Awesome on–line games

Conferences & Special Events

- Monthly special events—conferences with Commodore legends such as: Jim Butterfield, Fred Bowen, Nick Rossi, Matt Desmond, Maurice Randall, Gaelyne Moranec–Gasson, Jim Brain, and CMD's own Mark Fellows!
- Open chat areas with lively debate
- Nightly open forums on various C64/128 related topics

C-64/C128 Files & Support

- Over 10,000 files for C64/128—largest Public Domain and Shareware upload/download area in the U.S.
- Technical support from the experts—CMD products, GEOS, programming, games, and much more!
- Open discussions allow Commodore users to help each other with problems

Genie

Voice Assistance 1-800-638-9636

How to log on:
- Dial 1-800-638-8369
- Upon connect, type HHH
- At prompt U#=, type SIGNUP <RETURN>

Terminal Program Configuration:
300/1200/2400 baud
Terminal Emulation: ASCII or VT100
Half Duplex/Local Echo ON
8N1 (8 data bits, 1 stop bit, NO Parity)

Answer questions and follow the on-line instructions to complete init

© 1996 by Creative MicroDesigns, Inc.

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

CONTENTS

ISSUE 18

DECEMBER 1996/JANUARY 1997

COMMODORE WORLD

THE NEWS MAGAZINE FOR COMMODORE 64 & 128 USERS

GENERAL MANAGER
Charles R. Christianson

◆

EDITOR
Doug Cotton

◆

ASSISTANT EDITOR
Kimberly A. McCoubrey

◆

ADVERTISING SALES
Charles A. Christianson
(413) 525-0023

◆

GRAPHIC ARTS
Doug Cotton
Kimberly A. McCoubrey

◆

ELECTRONIC PRE-PRESS & PRINTING
Mansir/Holden

◆

Cover Design by Doug Cotton
&
Kimberly A. McCoubrey

Commodore™ and the respective Commodore product names are trademarks or registered trademarks of Escom GmbH. Commodore World is in no way affiliated with Escom GmbH., owner of the Commodore logo and technology. Commodore World is published 8 times annually by Creative Micro Designs, Inc., 15 Benton Drive, East Longmeadow MA 01028-0646. Second-Class Postage Paid at East Longmeadow MA. Annual subscription rate is US$29.95 for U.S. addresses, US$35.95 for Canada or Mexico, US$45.95 for all EC Countries, and US$57.95 to all other addresses worldwide. All subscription payments must be provided in U.S. Dollars. Mail subscriptions to CW Subscriptions, c/o Creative Micro Designs, Inc., P.O. Box 646, East Longmeadow MA 01028-0646.

Entire contents copyright © 1997 by Creative Micro Designs, Inc., unless otherwise noted. No part of this publication may be printed or otherwise reproduced by any means without prior written consent from the publisher. All programs published in this publication are for the personal use of the reader, and may not be copied or in any way distributed. All rights reserved. Programming examples and routines in this issue which are presented for educational purposes may be used in the creation of programs by the purchaser of this magazine, provided credit for the routines is clearly presented in either the program documentation, or the program itself. Creative Micro Designs, Inc., assumes no responsibility for errors or omissions in editorial, program listings or advertising content. Creative Micro Designs, Inc. assumes no liability for advertisers claims or reliability.

POSTMASTER: Send address changes to: CW Address Changes, c/o Creative Micro Designs, Inc., P.O. Box 646, East Longmeadow MA 01028-0646.

FEATURES

10 DO CHICKENS EAT APPLES? *by Anthony Cote*
An interesting perspective on the success of Commodore.

18 SPECIAL REPORT: SUPERCPU UPDATE *by Doug Cotton*
What's the status of the SuperCPU 128?

14 COMMODORE DRIVES ARE HISTORY: PART II *by Jim Brain*
Reach back in time with this historical follow-up.

REVIEWS

26 GAMES *by Jason Compton and Sherry Freedline*
McRat, The Zinj Complex, Jordan vs. Bird: One on One, and Karnov.

28 LOADSTAR'S COMPLEAT CROSSWORD *by Jason Compton*
If you enjoy being puzzled, this LoadStar offering may be just for you.

COLUMNS

22 JUST FOR STARTERS *by Jason Compton*
A SuperCPU primer for beginners.

30 GRAPHIC INTERPRETATION *by Paul Sullivan*
DualTop: An Alternative DeskTop

32 CARRIER DETECT *by Gaelyne R. Gasson*
Find out how to make effective Internet searches.

36 GEOPROGRAMMIST *by Maurice Randall*
Learn to avoid some common GEOS programming pitfalls.

38 ASSEMBLY LINE *by Jim Butterfield*
Simple numerical input in machine language.

42 PERIPHERAL VISION *by Jim Butterfield*
An in-depth look at how the Commodore keyboard operates.

44 BASIC INSTINCTS *by David Pankhurst*
Programming tips and more!

48 816 BEAT *by Doug Cotton*
Speedy division is breeze on the 65816.

DEPARTMENTS

2 FROM THE EDITOR
4 BACKTALK
6 ON THE HORIZON
8 COMMODORE TRIVIA
48 CLASSIFIED ADS
48 ADVERTISER'S INDEX

See Our NEW CHECKSUM Utility On Page 41

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

FROM THE EDITOR

Happy New Year!

Once again we've crossed that boudry that divides the old year from the new. And to the amazement of many of our contemporaries, we're still using our trusty Commodore computers. Some are writing letters, some are tracking stocks, others are just playing games. But all have one thing in common... that familiar old electronic friend that has kept us company all these years. And that friend continues to help us with our work, and entertaines us when work is the last thing on our minds.

Fifteen years after the introduction of the Commodore 64, and there's still a large following—despite the availability of systems running at clock speeds 200 times greater, and with RAM and hard disk storage that once would have made any reasonable hardware designer dizzy. The fact that we are still using our 'dinosaurs' says a lot about the endurance and effectiveness of a simple design.

Yet, we haven't all survived this long without some level of upgrading to our systems. Long ago, this meant replacing a tape drive with a disk drive, or getting a monitor so that we could stop tying up the television. Later it meant getting a cartridge or other hardware to help speed up disk access, buying a 3.5-inch disk drive, adding a RAM expander, and eventually, perhaps even a hard drive.

The past year has brought us a new enhancement: the SuperCPU, now pushing processing speed on our Commodore computers to previously impossible new highs. And the year just beginning promises to bring us more innovations, like the Turbo232 modem interface, the SuperCPU RAM expander, and the SuperCPU 128—all discussed elsewhere in this issue of Commodore World. Major new software releases are also planned, as well as updated versions of programs like Novaterm, geoFAX, and even Desterm 128.

As we have done in the past two and a half years, Commodore World will continue to bring you news and details of these new releases, and strive to make your Commodore experience as fulfilling as possible.

Happy New Year!

Doug Cotton
-Editor

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

LOADSTAR® MONTHLY

LOADSTAR is a monthly "magazine on disk" for the Commodore 64/128. Subscribers receive two 1541 disks (or one 1581 disk) in their mailbox every month packed with news, articles and programs. These non-PD, high-quality programs are written by the best home-based programmers in the field and edited by the crack LOADSTAR team of Fender Tucker and Jeff Jones. Subscription prices are at an all-time low of $69.95 for a 12-month subscription, or $19.95 for a three-month subscription. You may also elect to subscribe "by the month," where we charge your credit card $7.95 for each issue after it's shipped. We also offer the long line of standalone products below.

✔ **NEW Games Disk! The Compleat Jon:** 11 Games! The whole gamut of gaming is covered here: artificial intelligence, role-playing, mazes, fantasy, science fiction, education and even non-violence (which was a radical concept in its time). These eleven games are among the best ever published on LOADSTAR. Listed on the menu in chronological order, so you can see how Jon's style changed as the years rolled by. **1581 disk 0021D3 $20. 1541 disk #0038D5 $20**

✔ **NEW Puzzle disk! The Compleat Crossword:** Every crossword puzzle published in Puzzle Page in one huge collection! 220 puzzles! It uses Barbara Schulak's CRUCIVERBALIST program to present the puzzles and allows you to "mark" a puzzle when it's solved so that you know which you've solved and which you haven't yet. Each 1541 disk contains 110 puzzles. **1581 Disk #0020D3 $20. Disk 1 (1541) #0036D5 $10.Disk 2 (1541) #0037D5 $10**

✔ **NEW C-128 Productivity! The Compleat Lee O:** Six of Lee O. Clinton's best serious programs for the C-128 80- column mode. Finance, auto expense, kitchen helper, genealogy, resume writing, mutual funds! **One 1541 disk #0032D5. One 1581 disk #0017D3 $10.00**

✔ **NEW Word Search! Super Star Search 1:** 200 original word search puzzles by Steven Thomas and Art Dudley, presented by John Serafino's modern point and click program. **One 1541 disk #0011D5 One 1581 disk #0008D3 $20.00**

✔ **NEW Story disk! The Compleat Prosequest '95:** NEW!!! A 1541 disk with all of the entries in the 1995 short story writing contest on it, including the three grand winners. **One 1541 disk #0035D5 One 1581 disk #0019D3 $5.00**

Soft Wear! LOADSTAR T-Shirts: Limited edition Fruit Of The Loom T-shirts. LOADSTAR's nemesis, Knees Calhoon, stands up to regular washing and drying. Where else can you find Commodore apparel? 50% Cotton//Polyester. **$15.00 each with *free shipping*! Small #960025, Medium #960125, Large #960225, X-Large #960325, XX-L #960425**

Tools! Tutorials! The Compleat Programmer: Best seller! Over Two megabytes of knowledge crammed and stuffed onto eight 5.25-inch disks or two 1581 disks! Plus tools, extensions, languages, assemblers, tutorials and utilities! **5.25 set #0005D5. 3.5-inch disk #0005D3. For $5 more, get C= Hacking MAG #0006D3 (on 3.5-inch disks only and NOT available separately)** to complete your programming set. **$20.00**

PS Graphics! Compleat PS Vol. 1 (The Print Shop by Broderbund or Printmaster required). Over 1300 artistic and never before published PRINT SHOP images. Scan through the many PRINT SHOP images sequentially, by name, or by group number. Press a key and save the graphic you want in 2-block, 3-block and even PRINTMASTER graphic files! All that plus a printed guide! Each volume is $20.00. **Vol. 1: C-64/128 3.5-inch disk item #0001d3. 5.25-inch disks item #0009d5. Vol. 2 (graphics from past LS issues): C-64/128 3.5-inch disk item #0002d3. 5.25-inch disks item #0010d5.**

GEOS Clipart

LOADSTAR presents the biggest Geos collection of clip art and fonts ever offered at one time. All of the Geos art that's ever appeared on LOADSTAR, as well as some great files from Geos fanatic Dick Estel, are available on twenty 5.25 inch disks or eight 3.5 inch disks. Most of this has never been seen before! Use these graphics in your GeoPaint, GeoWrite and GeoPublish documents or convert to FGM with FGM utilities. Spiff up your GeoFAX documents with the appropriate graphic -- every time! Prices are $20 for any two 3.5 inch disks, or any five 5.25 inch disks. You can purchase the whole collection for $75 for either version. Call LOADSTAR toll-free at 1-800-594-3370 or 1-318-221-8718 to order by credit card. Or send check or money order and specify (by LG number) which disks you want.

5.25-INCH DISKS

Disk 01 - RAILS: Railroad art from Europe and the USA **#0012D5**

Disk 02 - VEHICLES/TAROT: Artwork of old and new autos; excellent geoPaint drawings of the Tarot card set **#0013D5**

Disk 03 - CLIP ART: Includes converted MacPaint files that have never before been available in Commodore format **#0014D5**

Disk 04 - OTTOWA/PRIME CLIPS: Artwork of the main landmarks of Ottowa; plus high quality public domain clip art **#0015D5**

Disk 05 - FONTS: More than 30 fonts from past issues of LOADSTAR, plus articles (in geoWrite format) on creating fonts. Also two ready-made headers for use with your own documents, one a picture of a mail truck; the other reading FROM THE DESK OF **#0016D5**

Disk 06, Disk 07, and **Disk 08** - geoPaint and Photo Album files with the great clip artwork featured on past LOADSTARS - Includes GeoCurmudgeon, Anamalia I and II, Australian Animals, Valentine art and many more **#0017D5, #0018D5, #0019D5**

Disk 09 - GOODYKOONTZ FILES - Jasper Goodykoontz, born in Indiana in 1855, produced Goodykoontz's Perpetual Calendar and General Reference Manual (A Book for the Millions). This disk includes scans from the book of a wide array of subjects -- Gestures and Attitudes, Poultry, Craniology, and more. **#0020D5**

Disk 10 - OLD WEST: Scanned Artwork from Dick Estel's FRD Software - mostly woodcut style art of the old west, gold rush days and pioneer scenes. **#0021D5**

Disk 11: J. Neely Art/Animals: Jennifer Neely works with a wide variety of subject matter and materials. Disk contains some of her favorites, scanned into geoPaint format. Side 2 is a collection of scanned artwork of animals from FRD Software **#0022D5**

Disk 12 - HOLIDAY: Artwork for New Years, Valentine's, St. Patrick's Day, Halloween, Thanksgiving and Christmas **#0023D5**

Disk 13 - PEOPLE/FACES: Scenes of people and faces from FRD Software **#0024D5**

Disk 14 - FRD CLASSICS: Dick's choice of the best of the FRD collection **#0025D5**

Disk 15 - DINOS/CLASSICS: Dinosaurs and other prehistoric beasts, as well as more first choice artwork from FRD. **#0026D5**

Disk 16 - SPORTS/MISC: Dozens of sports-related clips **#0027D5**

Disk 17 - OFFICE AND SCHOOL: Clips to be used at work and around the house **#0028D5**

Disk 18 -MUSIC & MORE SCHOOL CLIPS #0029D5

Disk 19 - SEASONAL AND HOLIDAYS: A clip for any occasion **#0030D5**

Disk 20 - SEASONAL AND HOLIDAYS: A clip for any occasion **#0031D5**

3.5 INCH DISKS

The 3.5" disks are roughly equivalent to two and a half 5.25" disks.

Disk 1: Equals disks 1, 2, 4B #0009D3
Disk 2: Equals disks 3, 6, 7A #0010D3
Disk 3: Equals disks 5, 8, 7B #0011D3
Disk 4: Equals 9, 10, 11A #0012D3
Disk 5: Equals 12, 13, 11B #0013D3
Disk 6: Equivalent of Disks 14, 15 and some bonus files not on 5.25" disks **#0014D3**
Disk 7: Sports, Office and school, Music #015D3
Disk 8: Music, Holiday and Seasonal #016D3
For your convenience, GeoViewer is included on each volume. GEOS 2.0 is suggested.

Free Shipping! For Every Item on this page!

Diskfulla Card Games! The Compleat Maurice: A compilation of 26 solitaire card games written by Maurice Jones, the acknowledged master of card game simulations for the C-64/128. There's even a brand new, never before published game called Boomerang. **Two 5.25 inch disks #0007D5 or one 3.5 inch disk #0007D3. $20.00 postage paid!**

Oodles Of Stunning Art! Tutorials! The Compleat Walt: During LOADSTAR's first ten years we have published 24 of Walt Harned's slideshows and multimedia events. Now we've gathered them into one huge collection: seven 5.25 inch disks or three 3.5 inch disks! There are over 250 pictures, including some that have never been published. The greatest one-man collection of art on any computer platform. **5.25-inch disks order #070425 3.5-inch disks order #070423. $20.00 postage paid!**

Loadstar Order form ☎ 1-800-594-3370

QTY	Description	Item #	Price ea.	Total

Use extra sheet of paper for large orders

Name _____

Address _____

City _____ State _____ Postal Code _____

Total Enclosed: _____

❑ Check/money order made payable to "Loadstar" in US Funds

❑ MasterCard ❑ Visa ❑ American Express ❑ Discover

Card # _____

Exp Date ____/____ Authorized signature: _____

Subscribers: I prefer ❑ 5.25-inch diskettes ❑ 3.5-inch diskettes

LOADSTAR
P.O. Box 30008, Shreveport, LA 71130-0008
Questions: 1-318-221-8718 Fax 1-318-221-8870

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

BACKTALK

LETTERS AND QUESTIONS FROM OUR READERS

GEOS Printing Utility

In a recent Graphic Interpretation column the author talks about GEOS print programs that allow using a printer's internal fonts. I'd like to contact the author to ask if he might be willing to Email me one of these. Can you provide his Email address?

Also, it would be helpful if references to programs in articles like this were accompanied by information indicating their location on the web. Also Commodore World might consider adding a files section to the current web page specifically for Public Domain/Shareware files referenced in the magazine articles.

- Clark Alexander

While some of our writers have internet Email, not all of them do, and not all of them wish to have their Email address published. When authors include an Email address for publication, we're happy to oblige with publishing it. For those authors who do not have an Email address, or do not wish to have it published, please feel free to address your correspondence to them directly to Commodore World's Email address:

cmd.cw@the-spa.com

I'd suggest that you also begin your message with a note requesting that Commodore World forward the message to the appropriate author.

Concerning the specific program you asked about, which I assume was TEXTPRINT 1.0, I checked a few of the most popular Internet FTP sites for Commodore and GEOS programs and came up blank. I also did an FTP search using a search engine, but again came up empty.

A quick check of the files on Genie, however, turned up versions 2 and 2.5 of TEXTPRINT, in the GEOS libraries maintained by the Commodore Roundtable. The files are:

TEXTPRNTV2.SDA (Commodore File #14110)
TEXTPRT25.SFX (Commodore File #14177)

In addition, this search also yielded a version of the program which was modified for use with Hewlett-Packard printers, which use a different set of printing codes. That version was split into two archives:

HPTXTPRNT1.SDA (Commodore File #14107)
HPTXTPRNT2.SDA (Commodore File #14108)

As for starting up an FTP site ourselves, we have looked into that. However, because of the time and expense that would be required to create and operate an FTP area, it was decided that this would not be possible at this time. While it is possible we could do so at a later date, we would first need to find a way for such an added service to pay for the time and the online storage that would be required to create and maintain it.

- Ed.

SwiftLink Programming Info

I would like to suggest that a good future article for CW magazine would be a good basic routine to add to a basic program which would allow one to communicate to a Swiftlink. If such info is already available.

- Richard C. Kirk

We do appreciate the suggestion. However, SwiftLink needs to be programmed in machine language, not BASIC, and the programming of this device is a rather involved subject. For those who are interested, CMD does offer a programming guide for SwiftLink, which can be ordered directly from CMD's order line (1-800-638-3263). That information will also be made available on CMD's web site at some point in the future. We should also mention that CMD has discontinued SwiftLink, and replaced it with a new modem interface, the new Turbo232.

- Ed.

Searching for Printers?

Several years ago, I visited a store in Santa Ana that was strictly for Commodore Computers. Unfortunately, I do not remember where the store was and have not been able to find an advertisement for them in any of my husband's computer magazines. I am in need of a new printer that will be compatible with a Commodore 64, and was wondering if you knew of any locations in Southern California that would have any of these printers. Currently I have an Okidata 120 and wouldn't mind another one of the same if they are available anywhere.

- Anonymous

Commodore compatible printers, like your Okidata 120, are no longer being made. Most users now must use standard printers which can be attached via a printer interface. However, you can often find printers such as the one you're using in the used market. In fact, many of the advertisers in Commodore World sell used and/or refurbished printers. Commodore Country, Creative Micro Designs, and Tech Star are probably the most common sources for these.

You might also try one of a number of online resources. One suggestion would be the eBay Auction Web at http://www.ebay.com/aw/. Another good place to check is http://www.televar.com/~rjlong/stores.html, which lists a number of sources for Commodore equipment located in your state (and many outside your state, too).

- Ed.

Commodore Tower

I'm searching for an article which according to a source in comp.sys.cbm was published in Commodore World, Issue 10, volume 2, number 6. The article was about creating a Commodore "tower" computer.

- Jack Followay, Jr.

Commodore World Issue 10 did feature a Commodore 'tower' on the cover, and there was also a pictorial of other unusual Commodore creations, all designed and made by Al Anger. However, there was no actual article on creating these items. Also, we ran out of Issue 10 a few weeks ago, although we do make photocopies of it and other out-of-print issues available along with our regular back-issues.

- Ed.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

COMMODORE WORLD

The only real magazine for C-64/128 users

For more than two years, Commodore World has empowered C-64/128 users by providing the latest news and information on the world of Commodore computing. Through our staff of leading experts like Jim Butterfield, Maurice Randall and Gaelyne Gasson, we keep you in touch with new technologies and further explore those features which have made the Commodore great! Subscribe or renew today!

Call 1-800-638-3263

and subscribe or renew now!

Please begin my subscription to Commodore World as soon as possible!

Subscriber Information

Name: _____

Address: _____

City: _____ State/Prov. _____ ZIP/PC: _____

Country: _____ Phone: ( ) _____

One Year Subscription (Eight Issues)

United States.....$29.95 Canada & Mexico.....$35.95

Europe (EC Only).....$45.95 Other Foreign.....$57.95

Back Issues:

Single issues $4.95 each plus $2.00 shipping. Three or more back issues $4.00 each plus $1.00 each for shipping and handling.

Payment Information

❑ Bill me later (one year subscriber only)

❑ I've enclosed a check or money order in U.S. Funds

❑ Bill subscription to my credit card: (Check one)

❑ Visa ❑ MasterCard ❑ AMEX ❑ Discover

Card Number: _____ Exp. Date: _____

Signature: _____

Mail payments to:

CW Subscriptions
c/o Creative Micro Designs, Inc.
P.O. Box 646
East Longmeadow, MA 01028

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

ON THE HORIZON

COMMODORE AND COMPUTER INDUSTRY NEWS

Announcing the new C-64 CDROM "Audio Vol 1"

While we don't usually publish info about CD-ROMs with Commodore content, more often than not that is due to the content being made up of blatent copyright violations. Also, most such CD-ROMs are generally pointed toward emulator users, not actual Commodore users. We found the following announcement to be a little different, so we've decided to pass this one on for the benefit of users who either have a CD-ROM interfaced to their CMD HD, or some other means to transfer from CD-ROM to their Commodore computer:

Unlike other C-64 CDROM disks, which are collections of games, this CDROM has over 6,000 SID files along with utilities and players. This collection of SID Files includes over 2,000 stereo SID files and many Singalong SIDS. Also included is PLAYSID and playsid sid collections.

The new C-64 CDROM "Audio Vol 1" is available for only $25, shipped anywhere in North America (add $5 for shipping elsewhere in the world—$30 total in US funds). For immediate shipment send a money order to:

Corey Kelts
5871 Blue Iron Way
Kearns UT 84118
Email: ckelts@media.utah.edu

GO64!?

We recently reported that the German publication 64'er was no longer being produced. In its wake, however, the following announcement appeared on the Internet:

After the demise of the last German C64/C128 magazine *64'er*, my friends and I decided to make our own German Commodore magazine. It will be called *GO64!*, and will be available via subscription only. Here are a few facts about our magazine.

There are five editors, two in Germany, and three in Austria. The Germans are CSW/Plush and Vectrocon/Fairlight, the Austrians are Spockie/T'Pau, 2Hip/T'Pau, and Rudi/GIG (GEOS Interests Group). The magazine will be layed out in Austria and printed and shipped in Germany twelve times annually.

The magazine will cover as many C64/C128 topics as possible, e.g. GEOS, hardware and software reviews, scene related topics, internet stuff, games, hardware projects, reports, news, etc.

We cooperate with PPE, CMD, and all GEOS groups.The word of our arrival is currently being spread via IRC, newsgroups, and diskmags.

Some general info: A trial subscription of 3 issues will cost DM 24, a full subscription costs DM 94. These prices are for German subscribers, for shipping to foreign countries, there will be an additional charge, but at this time I am unsure of the exact amount. If interested, please contact me at: spockie@giga.or.at.

If you don't have access to Email, please contact our publisher:

CSW Verlag
Goethestrasse 22
D- 71364 Winnenden
Germany
Telephone/FAX: ++49/(0)7195 61120

Inner Space Anthology Available

Another tidbit we recently found online is that Karl Hildon, author of The Complete Commodore Inner Space Anthology, has recently begun making this resource available once again. Here's what Karl had to say:

The Complete Commodore Inner Space Anthology is a collection of reference material for Commodore computers. It contains no reading—just page after page of charts and tables, including:

- Command summaries for BASIC, COMAL, ML;
- Jim Butterfield's memory maps for the PET, VIC20, C64, C128, and the 4040, 8050 and 1541 disk drives
- Machine language monitor commands
- PAL and CBM assembler commands and .opt directives
- Addresses of user callable ROM suboutines
- Jim Butterfield's "SuperCharts"
- Disk drive file header and sector format information
- SID chip note values
- Color codes, video chip data and video memory maps
- Character and sprite design templates
- Hardware port pinouts and transfer sequences
- IC chip pinouts

It also contains several indirectly related charts and tables:

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

- Sheet music symbols
- Note frequencies and chord derivatives
- Checking semiconductors with an ohmmeter
- Trigonometry rules
- Unit to unit conversions (approx. 800)
- Geometric area and volume formulae
- Periodic table of the elements

. . . plus much more!

Prices include shipping and handling:
From the U.S.A. - US $20.00
From Canada - Cdn $20.00
Outside North America - contact me at: "karlh@inforamp.net"

Send check or money order to:

Karl Hildon
4 Pollard Drive
Scarborough, Ontario, Canada
M1R 4G4

For Visa card orders, simply E-Mail your card number (sorry, Visa only) and expiry date to:

karlh@inforamp.net

The billing company on your invoice will appear as "Attic Typesetting, Inc."

Many who have already ordered have asked for an autographed copy. I'm not sure why anyone would want my scribbly signature on their brand new book, but requests will be humbly honored.

Faster Modem Interface from CMD

Creative Micro Designs has recently discontinued manufacturing their SwiftLink-232 cartridge, and have replaced it with a new product called Turbo232. The new product, which is program-compatible with SwiftLink, adds three new high-speed selections to support 57.6K, 115.2K and 230K bit per second communication rates. Turbo232 has also been redesigned for better hardware compatibility and easier configuration for users with special requirements. Announced price is $39.95, and shipping is slated for mid-January.

ERROR CORRECTION

A number of the program lines in the FSPLIT.CREATE program (CW17, ppg. 44–46) had incorrect line numbers, which if entered would cause the program data to be out of order. Specifically, lines 3328–3578 (on page 46) should have been 2560–2810 (with an increment of 10 for each line number).

User Group Connection

Looking for a Commodore user group in your area? User groups can help you solve problems, keep you informed of new products and events that might be of interest, and give you a chance to share your computing experiences with others who enjoy Commodore computing. The listings below include: Name, Address, Meeting dates, Number of members, Contact person, and Phone.

Suncoast Commodore Club
1555 Orange Street
Clearwater, FL 34616

Basic Bits Commodore Group
PO Box 81886
Cleveland, OH 44181-088

Commom Computer Club
6500 Center Ridge Road
Newburgh, IN 47630

Jackson Michigan CCC
33 Indian Trail
Munith, MI 49259

South Bay Computer Groups
PO Box 1899
Chula Vista, CA 91912-189

Tri-City Commodore Computer
320 NE C Street, Apt. A
College, WA 99324-212

Cincinnati Commodore Computer Club
c/o 31 Potowatomie Trail
Milford, Ohio 45150

Hamilton Commodore Users Group
35-1400 Limeridge Rd.
East Hamilton, Ontario L8W-1L7, Canada

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

COMMODORE TRIVIA

by Jim Brain

Welcome to another edition of Commodore Trivia. As many of you may know, these trivia questions and answers have been donated by me to the Commodore community at large. Unlike other articles in *Commodore World*, these trivia questions have been placed in the public domain. I ask only that the trivia questions remain intact and unchanged, and that my name and address appear somewhere so users can contact me. The trivia is also used for a contest I run on the Internet; contact me at the included address for more information. Because curiosity has the best of me, I always welcome a note or postcard detailing where the trivia goes. I also welcome new questions—provided they come with the answers. Enjoy!

Jim Brain
Brain Innovations, Inc.
10710 Bruhn Ave
Bennington, NE 68007
j.brain@ieee.org

COMMODORE TRIVIA #17 QUESTIONS

$100) On the MOS Technology's KIM-1, how many keys were on the keypad?

$101) The KIM-1 keypad had the common 0-9A-F keys on the keypad, but also had some special keys. Name them.

$102) The KIM-1 was a set of modules that could be plugged together to expand the system. Each module had a model number. What was the model number of the KIM-1 motherboard?

$103) On the 1525 line of printers, if you wanted to create the following graphic, what bytes would you send to the printer after turning on graphics mode?

$104) What is the horizontal resolution of the 1525 line of printers?

$105) On Commodore drives, explain the difference between the B-R command and the U1 command.

$106) On the Commodore 1541 drive, what does the U: command do?

$107) What does the first routine in the 1541 drive ROM actually do?

$108) How many files will a 1581 disk drive hold?

$109) Commodore 1581 drives have a special "autoboot" feature that enables the drive to load and run a program off a disk upon drive bootup. What is the required name of the file?

$10A) What filetype must the file mentioned in $109 be?

$10B) To power up a 1351 mouse in "joystick mode", what must the user do?

$10C) Describe the contents of the POTX or POTY registers when using a 1351 mouse.

$10D) Commodore computers typically use most of zero page for temporary variables and other items. However, both the VIC-20 and the 64 reserve 4 bytes for user programs that need zero page memory. Where are these locations?

$10E) Name the 16 colors available on the 64.

$10F) Both the VIC-20 and the C64 emulate the operation of the 6551 UART. How many "mock 6551" registers are mapped into the memory map?

$110) What is the name of the company that recently purchased the liquidated Commodore assets?

$111) At one time, Commodore attempted to manufacture a dual drive version of the 1571 called the 1572. For what technical reason did it utimately fail?

$112) Over what computer system did a User Group sue Commodore and win?

$113) In $103, the question asked how to create a graphic of a small box on the 1525. In this quesrtion, we have made a different design. If you wanted to create the following graphic using individual dots on the printer, what bytes would you send to the printer after turning on graphics mode?

$114) (Some C65 questions) How many SID chips does the the development Commodore 65 machine contain?

$115) What CPU does the Commodore 65 use?

$116) What is the alternate name for the Commodore 65?

$117) How many processors does the internal 1581-compatible drive on the C65 contain?

$118) In the tradition of naming certain ICs after famous cartoon characters, one of the ICs in the C65 is named after a Warner Brothers cartoon character. Which one?

$119) What version of BASIC is included on the Commodore 65 in C65 mode?

$11A) How many I/O ports does a Commodore 65 contain?

$11B) What common Commodore 64 I/O port does the C65 NOT have?

$11C) How many function keys are on a Commodore 65?

$11D) What CBM disk drive DOS was used as the template for the internal C65 drive DOS?

$11E) What resolution of text screen does the C65 power up in? (Please give answers in characters).

$11F) What distinguishing non-textual characteristic in the C65 is not present in othe Commodore 8-bit computers?

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

COMMODORE TRIVIA #16 ANSWERS

$0F0) The matrix was 8 by 8.

$0F1) 15359 bytes free.

$0F2) "standard mode".

$0F3) "alternate mode"

$0F4) chr$(142)

$0F5) chr$(14)

$0F6) Yes. The above translates as: LIST 60 through to and including 100.

$0F7) coL. "C" "O" "SHIFT-L". For those who are interested, the COLLECT command is analogous to the VALIDATE operation.

$0F8) 11 elements. Almost everyone who has ever programmed in Commodore BASIC has seen the "BAD SUBSCRIPT" error when they try to use the 12th element in a un-DIMensioned array.

$0F9) 10 bytes. Since this area could be POKEd to, many boot programs would poke characters into this buffer to simulate keypresses.

$0FA) A physical sector is 512 bytes in length. Internally, the 1581 creates 2 256 "logical" sectors in a physical sector, to maintain compatibility with older Commodore drives.

$0FB) The X64 series. That includes the Commodore 16, the Commodore 116, and the Commodore Plus/4.

$0FC) Even though you are looking for digital information (how far the mouse has traveled since the last movement in a particular axis), the information is read from the "paddle" or potentiometer (POT) registers. On the C64, the POT registers are part of the SID chip, and are at 54297 ($D419) for POTX, and 54298 ($D41A) for POTY.

$0FD) 802640 bytes.

$0FE) When the 1670 modem was first introduced, it powered up in auto-answer mode, which means it would answer incoming calls after the phone rang. You could turn this feature off through software control, but if the power was reset, the modem would answer the phone. So many people complained to Commodore that CBM revised the 1670 to include an extra DIP switch that turned this feature off.

$0FF) The 1600 manual dial/manual answer 0-300 bps modem. The author owns one, and used it for many years. To operate, you must use a phone with a detachable handset cord. You dialed the number on the phone, waited for the answer, unplugged the handset, and plugged the cord into the 1600. A switch toggled between using originate or answer frequencies. The 1600 was manufactured by Anchor Automation for Commodore. (As an aside, this unit claimed 300 bps, but I never could get 300 to work well. Most of my telecommunications happened at 150 bps.)

Paxtron CORPORATION

COMMODORE CHIPS AND PARTS

We also carry Amiga parts, Motherboards, Power Supplies and all surface mounted ICs

Paxtron CORPORATION

Upgrade Chips

6510, 6526, 6567,6569, 6581, 6522, 8502, 8562, 8500, 8563, 8564, 8721, 8722, 325302, 390059, 251968 .. $8.95
901225, 901226, 901227, 906114PLA..$6.95
251715, 251913, 8580,WD1772 .. $10.95
314972-03 (C128 ROM Upgrade) .. $24.95

Motherboards

1541 (Refurb.) $14.95
1571 (NEW) $19.50
C-64 (Refurb./tested) $21.95
C-64 (untested, as is, all chips) . $17.95
C-128 (NEW) $49.95
C-128-D (NEW) $52.50

Diagnostics & Manuals

Commodore Diagnostician: Guide to diagnose & fix C64/128/1541 .... $6.95
Manuals: MPS 802 & 1230, 1084, 1902, 1581, 1526, 1571, 801, C64, C128 .. Call
We are now receiving manuals for all Commodore products from SMG ..... Call

Floppy Disk Drives

1541 (Refurb.) $39.95
1571 (Refurb.) $49.95

Miscellaneous

128-D Keyboard (NEW) $27.95
C-64 Keyboard $14.95
Monitor Cables ..... Call
1541/1571 Alignment Kit $15.95
1084S Motherboard w/ Flyback $69.95
1084S Power Supply Board (Refurb.) $29.95
C-64 Cabinet (Top/Bottom) $12.95
Commodore Joystick (Capt. Grant) $2.95
256 x 1 (41256) $3.39
1541 Serial Cable $4.95
Video Cable $5.95
Verbatim 5.25 SS/DD Disks(10 Pak) . $1.99
Amiga A500 (Rev.3) NEW Motherboard with all Chips $59.95

Power Supplies

(All Power Supplies are NEW)

C-64 non-repairable $14.95
C-64 repairable $19.95
C-64 Heavy Duty (5.2 amps) $39.95
C-128 Heavy Duty (5.2 Amps) .. $39.95
5.2 amps for Ram Expander Units $39.95
1541II external 110 volts $7.95
1581 external 110 volts $7.95
1084S Flyback (Phillips) $35.50
1084-D1 Flyback $35.95
1084 Flyback (Daewoo) $35.95
Str54041 for 1802C Monitor $12.95

- ***1084S MOTHERBOARD WITH FLYBACK TRANSFORMER:*** This new CBM board will cure 90% of 1084S problems. Simply switch the PCB and your monitor problems are solved! This motherboard with factory mounted flyback, is the exact replacement and works with all 1084S monitors. It is also very easy to install ..... **$69.95•**
- ***CD32 MOTHERBOARD:*** Contains all chips(Lisa, Alice, Paula, 68020-16, ADV101) except the 512K memories **$89.95**
  With all memory **$109.95**
- ***COMMODORE 1976 SCIENTIFIC CALCULATOR:*** Save a piece of the past. Brand new with charger and manual **$8.95**

Monthly Special

A500 AMIGA COMPUTER COMPLETE

Paxtron has acquired 250 refurbished A500 computers from Commodore liquidation. This is the perfect time to upgrade to an Amiga at the perfect price.

The A500 COMPUTER with power supply and latest chips (eg: 8372 Agnus, 204 O/S). Includes your choice of the following software/books: Starter Kit (Inc. Kind Words, Deluxe Paint II) or Deluxe Kit. Also includes free Amiga Troubleshooting Guide ($7.98 value), 90 day warranty, tested and ready to go.
Fantastic price..... $119.95
Options: A501 1/2 meg expansion memory board installed add $10.00 • With 3.1 O/S ROM add $48.50 • PAL unit with 220V power supply add $29.00 •

WE'RE ON THE INTERNET! COME VISIT OUR HOME PAGE AT: www.paxtron.com

Paxtron CORPORATION
28 Grove Street
Spring Valley, NY 10977

ORDERS 800-595-5534 • 800-815-3241 • 888-PAXTRON
Info 914-578-6522 • FAX 914-578-6550
E-Mail for orders & correspondence:
paxtroncorp@rcknet.com

Hours: 9AM - 5 PM EST
Add $6.00 for UPS Charges

We gladly accept:

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Do Chickens Eat Apples?

by Anthony Cote

It's not surprising to most Commodore owners that in the early 1980's (1982 to be exact), the C-64 was the fastest selling and most popular personal computer of all time. CBM had almost 50% of the entire computer market, while companies like Apple, Atari, and Radio shack had "The high-end of the market". CBM went for the low-end, the under $500 market. Jack Tramiel was once quoted as saying, "We sell to the masses, not the classes".

What does all this have to do with the Apple II? During the C-64's hay day, the Apple II was in the "Hi-end" $1000+ category. It's true that both computers used the 6502 as their processor, but there was much more the computer and its popularity. It was noted as a sophisticated, powerful, super personal computer. Was the architecture so much more advanced compared to the C-64, warranting it's high price? The Apple II is not merely a close cousin to the C-64, but quite possibly it's "big baby brother".

History of the Apple II

In the early 70's, I came from an area of academia designing both hardware and software for vertical market applications. Working with the National Science Foundation, I began with the Mark 8, the IMSIA 8080 (an S100 buss), MOS Technologies Kim-1, and the RCA Cosmac VIP. After NSF, I went to work for Milton Bradley's newly built Advanced research center in 1979. I was working on the MB-1—a 16-bit personal computer, later acquired by Texas Instruments and renamed the TI-99 Home computer. (The history books do not recognize that Milton Bradley was the first to create the 16-bit home computer.)

While working on the MB-1, we had a department called "The Orchard". As the name suggests, this was a room full of dozens of Apple II's. Developers were busy redesigning Milton Bradley "Board" games into Apple II computer games. A good friend of mine, David Winzler (the chief software developer for the "Orchard"), introduced me to the Apple II. I had to have one, but the price was a bit steep for my wallet. So, having the schematics at hand, and the chips being fairly cheap, I built my own Apple II from scratch for about $200!

In the 1981-83 time frame, Milton Bradley, trying to redesign a new home computer, was pushed out of the market. The entire department was laid off in 1983; advanced research was closed down. TI's 99/4A's home computer division collapsed as well as Mattel's "Intellivision", the Timex Sinclair, and a host of other newcomers. We were all pushed out of the market by the latest lowest cost system in town. The Commodore C-64. I went on to continue developing on the Apple II platform, and then in 1985, converted over to Apple's Macintosh.

Presently, I am a member of the CMD family and have learned a great deal about the classic 6502 based machines, the C-64, 128's etc, which I had missed or overlooked years earlier. As I started to really enjoy these "new" machines, I saw similarities between the C-64 and A2.

The Apple I

Going back in time again, the subject this time, the Apple 1 and II. In 1975, the Homebrew Computer club in Palo Alto, California founded by Steve Wozniak (a 25 year old electronics hacker and an employee of Hewlett Packard), wanted to build their own personal computer. The 8080 chip, which was popular at that time, was the preferred microprocessor

http://www.oldgamesitalia.net/
http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Comparison of Apple II+, Apple // e, and C-64

	Apple II+	Apple // e	C-64
General			
Processor	6502	6502	6502
Speed	1 MHz	1 MHz	1 MHz
Memory	4K-48K	64K	64K
Expansion	eight 50 pin slots	seven-50 pin slots, one60 pin slot*	one 44 pin direct port, one 24 pin user port
Serial Port	no	no	yes
Disk Drive	5.25"/130K	5.25"/160K	5.25"/160K
Video Out	NTSC	NTSC	NTSC & Chroma
Sound Out	no	no	yes
RF Out	no	no	yes
Text			
Text Res	40x24	40x24	40x25
Text Color	none	none	3 Modes w/multi-color
Graphics			
Planes	none	none	Back/Foreground
Lo-Res	40x48	40x48	40x25
Colors	16	16	16
Hi-Res 1	280x192	280x192	320x200
Colors	Black & White	Black & White	Black & White
Hi-Res 2	140x192	140x192	160x200
Colors	6	6	4 w/2 modes
Sprites	none	none	8 w/multi-color
Sound			
Volume	2 Levels	2 Levels	16 Levels
Voices	1	1	3
Sound FX	none	none	Complete Synthesizer
Price			
System	$1200	$1200	$300
Disk Drive	$600	$600	$200

* This option allowed Apple's 80 column card with 64K of RAM to expand the Apple//e up to 128K, for an additional charge.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

by the club. Steve (often called "the Woz"), had experience with the 6800, but both processors where almost $200. He happened upon a new microcomputer chip put out by a new company called MOS technologies, for a little over $20. It took some doing, most club members wanted to stay with the 8080, but Steve convinced them to go with the MOS 6502. Along with 21 year old Steve Job's financial help, the Apple I was born in 1976 with 8K of RAM, one slot, and a pricetag of almost $700 without keyboard, power supply, monitor, or external mass storage (i.e. cassette interface). Wozniac, used inexpensive TTL chips for the entire design. These were all basic gate chips, shift registers, etc. and could be obtained anywhere for less than a dollar each. Even the screen display mapping was designed using these components. The only real expense (besides the PC board) for complex devices were the RAM chips and the 6502.

The Apple II

Enter The Apple II. With great successes with the Apple I, it was obvious that improvements had to be made to really direct this machine into the current infancy of the personal computer market.

The Apple I was redesign into the infamous Apple II, shown at the First West Coast Computer Fair in April of 1977 (the 2 or II is sometimes printed as the Apple II). The Woz and Jobs released it with 4K of RAM, expandable to 48K, with included empty sockets. NTSC Video out, an internal 3.5 amp 5 volt power supply, cassette I/O, and a keyboard were also added. Sound came from an internal speaker which could make tones *only* with special software routines that toggled the speaker with on and off selecting from a transistor. 8 slots were added to the new design to accommodate peripherals like serial cards, more memory etc.

A joystick and dual paddle port were also added, but were somewhat difficult to get to. The cover had to be removed and the Joystick cable was plugged into a 16 pin socket on the motherboard after snaking it through a hole in the back of the computer. It was not like the 9-pin external Atari or C-64 style. Believe it or not, it wasn't used very much and most games used the keyboard, go figure!?

The total cost of this 4K machine? A whopping $1,300 with game paddles, no monitor, just the video out. With no RF modulator available, a company began producing a UHF model that only cost $75. It also came with a cassette tape of programs, but no player, compared to the $600 Commodore PET or TRS-80 with cassette mechanism, this was a bit costly, but did have expandability—this was the clincher, the getter, the cross to the "High End" category. It was, as time did show, the main selling point. Lift the hood and drop in what was to become thousands of third party fifty pin "plug and play" extensions to the machine. There was even an 80 column card for $300. It cost $600 more for 8-50 pin slots, which may have been a little high for many families. I believe the Apple II could have sold for $600 and Apple Corp., now a giant company in Cuperetino, would still have made outstanding profits. In all fairness, however, even with the price, the Apple II did have excellent graphics for it's time, remember we are talking about 1977. Some Apple II features included:

- 40 character by 24 line text display with Inverse and flashing characters (no lower case)
- Lo-Res Graphics, 16 color 40 by 48 block resolution
- Hi-Res Graphics, 4 color 140 dots by 192 dots resolution
- Mixed Mode—with either Hi or Lo-res modes, this mode has 4 lines of text ONLY at the bottom with 40 by 40 Lo-Res Graphics or 280 dots by 160 dots above

The 5 and 1/4 floppy disk drive was finally available in early 1978 including the controller card carrying a $600 price tag.

Even with C-64 capabilities which existed 4 years after the Apple II was being sold, the Apple II in 1978 was ahead of it's time, but the next 4 years showed no real improvements except for the Apple II plus in June of 1979 at $1,200 (Only $100 cheaper than the original). The improvements were minor at best. Applesoft BASIC (written by a fairly new company at the time called Microsoft) replaced the Woz's Integer BASIC, an upgrade to DOS 3.3, 2 more colors added to the Hi-res mode and small hardware modifications and enclosure improvements.

Not until the entry of the Apple //e in May of 1983, were real improvements seen with new advanced designs—or at least they should have been! We all also know, that this was the time when our beloved C-64 was about a year old and known as "The fastest selling computer in the world".

This is were the breaking point of this article (and the breaking of this authors heart), occurs. Apple decided to improve the technology of the Apple II+, by redesigning the system using custom LSI chips. This would result in fewer internal components, upgrading the design to be more powerful and most of all, reduce manufacturing costs. Internally it's code name was Diana, but was later changed to "LCA", which stood for "Low Cost Apple". When the press got wind of the new low cost Apple II, they were expecting a competitive low cost Apple II price of about $400 retail. Inside the Apple camp low cost referred to manufacturing costs, not retail! Due to this leak and misunderstanding, the computer was immediately renamed the "Super II". Whew, the consumer almost found out! Sales were still outstanding at the same $1000 plus price tag, with over 50 thousand units a month sold (twice that over the II+), and there was no end in site.

What improvements made the Apple //e so special? Lets compare it to the older Apple II plus as well as the Commodore 64.

It doesn't take too much to realize that the redesign of the Apple //e was mostly for Manufacturing cost and little on advancing a four year old design. In 1978, the Apple II+, was a powerful little computer, preferred by many people. Compared to anything else on the market for an expandable personal computer, regardless of price, there was nothing that could touch it. Although by 1983, so much software was written for it, Apple just made improvements for themselves. Compatibility would have suffered. For an affordable computer with just as much capability (if not more) I believe that the above comparison shows the C-64 to have much more than the aging Apple II+ as well as Apple //e, especially in the area which matters most—$$$$.

As I currently do profess to be a C- 64 "convert", the more I use it, one question comes to mind. If I had it to do all over again, which machine would I pick? In 1979, I would have still home brewed the Apple II (because I could), but when 1983 came along, I wouldn't have missed shelling out $300 to buy a lot of fun with great graphics and sound. As a software and hardware designer, it would have enhanced my career. Apple could have advanced their machine in 83 to 256 colors, built in 80 column, etc., and kept compatibility also, to stay in the "High-end market". It just boiled down to timing, installed software, marketing, and the willingness to pay $1200 for a $300 machine.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Commodore World Special Report:

SuperCPU UPDATE

by Doug Cotton

Now that the SuperCPU 64 has been shipping for a while, the initial clamor has died down and users are beginning to ask, "When does the 128 version start shipping?" Add to this those who are asking about the various developer tools and memory expansion, then top it all off with the fact that Creative Micro Designs (CMD) has been fairly quiet about all of these things lately, and it begins to appear as if there might be something seriously wrong.

The reality of the situation, though, is that CMD has been quiet mostly because they've been very busy. Admittedly, though, things are taking longer than originally anticipated, and other necessary projects have added to the delays. But before we get too far ahead of ourselves, let's go back to the announcement of the 128 version, and then work our way forward.

The announcement of the 128 SuperCPU came after the 128 community made a strong showing, convincing CMD that a 128 version would be viable from a sales standpoint. At the time of the announcement, CMD realized that there would be some extra work involved to make a common main board, which was necessary to make the 128 version cost-effective. The release date of the 64 version was then pushed back from January of 1996 to March, and estimated that the 128 version would take an additional 60 days beyond that.

However, CMD encountered many more interfacing problems than they had originally anticipated. Dealing with these problems required extensive modification of the custom logic chip, or CPLD, in the SuperCPU. To further complicate matters, changing the CPLD became more and more difficult as the resources within the chip were diminished. Near the end of the design phase, the CPLD had to be completely redone a number of times to make additional logic functions possible.

Finally, in July—four months beyond the new target date—the SuperCPU 64 was ready, and shipping began. Knowing that the CPLD design phase had taken much longer than expected, and assuming that this would also be the case with creating a CPLD to emulate the 128's MMU, it would be impossible to get the 128 version to market in only 60 days. And there was newly discovered factor that hadn't figured into the original time estimate—a daughter card would be required for the 128 version, because Commodore hadn't allowed some 128 hardware features to be controlled from the cartridge port. It was starting to look like it would be the end of the year before the 128 version could begin shipping.

And then reports of problems with the 64 version on a few Commodore 64c computers starting coming in. Two more months of analysis and redesign to resolve timing inconsistencies with this specific Commodore model. Changes in staffing also came around this time, and with the loss of Wayne Wrubel—CMD's production and repair technician—engineer Mark Fellows was called on to fill in on production and repairs while training new engineering assistant and technician Tony Cote.

Once Tony began getting up to speed, Mark was finally able to get back to engineering. But so much time had passed with all the delays that another scheduled project needed immediate attention—a replacement for SwiftLink. Initial work on this project had begun over a year earlier, but was put off until the current supply of circuit boards could be exhausted. That time was coming quickly. SwiftLink had proven to be more expensive to produce than it really should be for various reasons, and worse, modem speeds were escalating quickly to the point of obsoleting the interface. Mark put in a couple of weeks on a new design, and passed the results on to Tony for a new board layout so that he could get back to work on the SuperCPU project.

After some initial work on the SuperCPU 128 MMU logic, the focus of development moved to researching the expansion RAM circuitry, which initially looked relatively simple. However, as Mark got a little further into the design, it became apparent that using DRAM (Dynamic RAM) and a standard approach to the RAM controller would not provide adequate performance.

Most of November, and the first part of December, was spent researching every type of RAM that might provide a performance boost. While some types did offer better performance, these came with added cost and were less commonly available in the marketplace. In early December, an interleaved memory scheme was investigated, but the method required additional logic that would raise the cost and space requirements of the controller—but there wasn't that much room available on the board.

The solution came in using 72-pin SIMMs—an idea that was earlier rejected because these SIMMs are 32 bits wide, making their use prohibitive. Upon closer inspection, however, only Error Correcting (ECC) SIMMs presented a problem—standard Fast Page and EDO types offer access to 8-bit segments of the 32-bit data. By combining standard Fast Page 72-pin SIMMs with interleaved access, adequate performance at optimal pricing was attained.

This brings us nearly up to date, as CMD is currently prototyping the RAM controller. CMD has also decided to release a separate SuperCPU 64 RAM expansion card as soon as possible, because this helps prove out the design for the 128 model, and is instrumental in getting developers going on new SuperCPU-based applications. The card will offer a single 72-pin SIMM socket, capable of holding from 1 to 16 Megabytes of RAM. Much of the work required to move from the prototype to the production model will be handled by Tony Cote, allowing Mark Fellows to continue work on the rest of the SuperCPU 128 circuitry and firmware.

Given the delays, and considering the amount of work remaining in the project, CMD estimates release of the SuperCPU 128 will be in April. CMD also wishes to express thanks to all the SuperCPU 128 customers who have waited patiently for this product. It's coming!

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Commodore Drives are HISTORY

PART II

by Jim Brain

Every so often, I receive a letter from a Commodore enthusiast or collector that asks about an odd Commodore drive. The person mentions that the drive contains the familiar Commodore logo and name, but it doesn't look like any drive they've ever seen. This doesn't surprise me, as most current Commodore owners grew up with the Commodore VIC and 64 line of computers, and have never seen a drive older than a 1541. They assume that the 1541, 1571, and 1581 drives encompass the entire spectrum of CBM units. These drives spark questions like "Did Commodore provide computers for the military?" or "Are these 1541 compatible drives made by another company and marketed by CBM?". Have you ever seen such a drive and wondered what it was?

Contrary to popular belief, neither the 1541, nor its predecessor the VIC-1540, begin the Commodore line of drives. I suppose some really don't care to know differently, but I find that knowing the history behind Commodore products helps me appreciate them and what they do. If you share that thought, continue on.

For those who may not know, this article is the second part of a series on CBM drives started in Commodore World Issue 11. The previous article described the serial drive lineage (1540 on). If you haven't read it, I encourage you to do so.

In The Beginning...

Depending on which reference you consult, the "beginning" concerning Commodore computers and peripherals starts in either late 1976 or late 1978. (See sidebar "When Did It Start"). In any case, Commodore introduced their first computer system, the "Personal Electronic Transactor 2001" or "PET", at this time. The machine included a system unit, a keyboard, a 9 inch black and white monitor, and a tape cassette deck in a single enclosure made from heavy 18 gauge steel. Although some claim the steel case was used to comply with FCC RF emissions regulations, the FCC had not yet issued such regulations. Truthfully, Commodore simply used in-house services. Since Commodore was in the office furniture business, the cases were made from sheet metal of the same type used to make metal desks and file cabinets. Anyone who has ever lifted a PET machine or its peripheral knows of the strength of these cases. Internally, the system contained BASIC 1.0 and a 40 column video display IC. Those who preordered the machines in June of that year received 4kB units, while units after introduction sported 8 kB or RAM. As for I/O, the unit featured a second tape drive port, a user port, and an IEEE-488 compatible port. The IEEE port was already in use on Osborne I portable computers, and this port was used by many scientific instruments to communicate with one another.

Given the impressive list of features that accompanied the PET, it is interesting to note that the ability to interface with a floppy diskette drive was not one of them. This is somewhat ironic, given the business background of Commodore and the fact that other systems sported disk drive interfacing abilities. While it is true that drives were priced a bit too high for most hobbyists, businesses could afford suitable diskette drives and needed to the advantages of diskette storage. In addition, the BASIC included with the PET (BASIC 1.0, also called "Original ROM" BASIC) did not support disk drives in any way. Thus, we begin our journey into Commodore drive history.

The "First" Commodore Drive

In December 1978, the first disk drive for the Commodore PET line of computers was introduced. The dual drive system utilized 2 single sided, single density 5.25" mini-floppy drive mechanisms and provided 100 kilobytes of information per disk side or 200 kB of online storage per unit. This drive holds at least one other distinction in addition to arriving first, it was not manufactured by Commodore.

Commodore owners know about "clone" or "Commodore compatible" drives. These drives, manufactured by companies other than Commodore, promise compatibility with a particular model or models of Commodore manufactured drives. typical examples in the VIC/CBM 1541 line include the Enhancer 2000 and FSD-1. Since compatibility is the primary objective, clone drives are measured by how well they emulate the Commodore counterpart. Given the nature of this series, we've refrained from discussing the many clone drives, but we'll make this one exception given the background of this drive unit.

It is somewhat misleading to call the first PET drive a "clone" drive, since it really didn't emulate any Commodore drive (since there weren't any out yet). Nonetheless, Commodore didn't

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

produce it. The drive, model DKH641, was developed and manufactured by (I am not making this up) "Convenience Living" and interfaced with the PET via a special disk controller board that was installed inside the computer. Some may ask why the unit required a special interface given that the PET came standard with an IEEE-488 port. Well, while Commodore did include the port on the PET system, the Operating System, complete with BASIC 1.0, it did not provide for disk usage. The OS, usually referred to as "Original ROMs", allowed only tape storage. The DKH641 drive contained its own Disk Operating System called DiskMon which added 14 commands to BASIC for disk access. The entire package, including the interface, retailed for $1295.00

Many people remember an early disk drive unit for the PET manufactured by "Computhink". The two drives are one in the same. The name change from Convenience Living to Computhink occurred by February 1979. In reality, research suggests the company was closely tied with or owned by a distributor of PET products called New England Electronic Company, or NEECO. Also at this time, Computhink increased the capability of the DKH641 by using double density mechanisms. This gave 200 kB of storage per drive or 400 kB online storage. The new model, listed as DKH642-1, retailed for the same price. In addition, a double sided version of the unit offering 400 kB per disk and 800 kB online storage was also offered.

The 10XX "internal" Drives

Even as the Computhink drives hit the market, Commodore was at work creating its first disk drive. Sources indicate these internal prototype drives were given model numbers. The first internal unit was numbered 1010, with a model 1020 and 1030 following. Research indicates Commodore showed the final unit, model 1030, to PET enthusiasts before finalizing a design. Some users reported knowledge of the unit and noted that the unit was "very buggy". Whatever their function, information suggests that Commodore did not market the 10XX drive line.

The PET/CBM 2040

The Commodore model 2040 disk drive holds the distinction of being the first Commodore produced PET floppy drive unit. Initially offered for sale in April 1979 for $1295.00 (the same price as the Computhink DKH641/6420X), the 2040 utilizes 2 Shugart Associates 5.25" full height single sided double density drive mechanisms with pushdown door latches and a computer board enclosed in the same 18 gauge sheet metal as the PET computer system. The unit measures 6'5" high by 15" wide by 14.35" deep and contains the drives side by side in the enclosure. The unit features off-white paint on top and black painting on bottom to match the PET case color. A black decal runs across to the top front of the unit with the traditional Commodore "chicken feet" log and the Commodore name printed on the left side. A large "CBM" with the text "model 2040" appears in the middle of the decal, while the words "dual drive floppy disk" appear on the right.

As for usage, the drive interfaces to the PET by means of the IEEE-488 I/O port. However, since the original OS in the PET could not handle disk drives, buyers had to upgrade the ROMs in their PET system to utilize the new drive. The new ROMs were nicknamed "Upgrade ROMs". The two drives are addressed within programs as the same device number (factory set to device 8) with separate unit ids (0 and 1). Strangely, the units are positioned in the case in reverse order. Unit 0 is on the right, while unit 1 resides to the left of the drive enclosure. 3 LED's signal activity, power, and error conditions. Each drive contains its own red activity LED, while a middle red LED indicates an error.

Data is written to 5.25" SS-DD floppy disks using the Group Code Recording (GCR) method (See What is GCR?). Each drive initially held 176,440 bytes of information, of which the user could utilize 170,850 bytes for program and data files. A query of the disk operating system version on original units returns 1.0. The DOS is similar to and accepts most of the commands found in the familiar version 2.6 DOS in CBM 1541 drives. One notable exception from the Ddrive DOS is relative files. While the 2040 could handle Random files (basically a fancy name for raw data storage), the drive did not understand the concept of relative files.

Internally, the 2040 packed a lot of power. The 2040 unit contains not 1 but 2 central processing units. In an era when most drives either did not contain an onboard CPU or contained at most a single CPU, Commodore's parallel processing drive units rose above the ordinary. The unit contained a MOS 6502 CPU as well as a MOS 6502 CPU (a 6502 derivative). Each accessed its own I/O and timers, while the two processors shared access to 4 kilobytes of RAM.

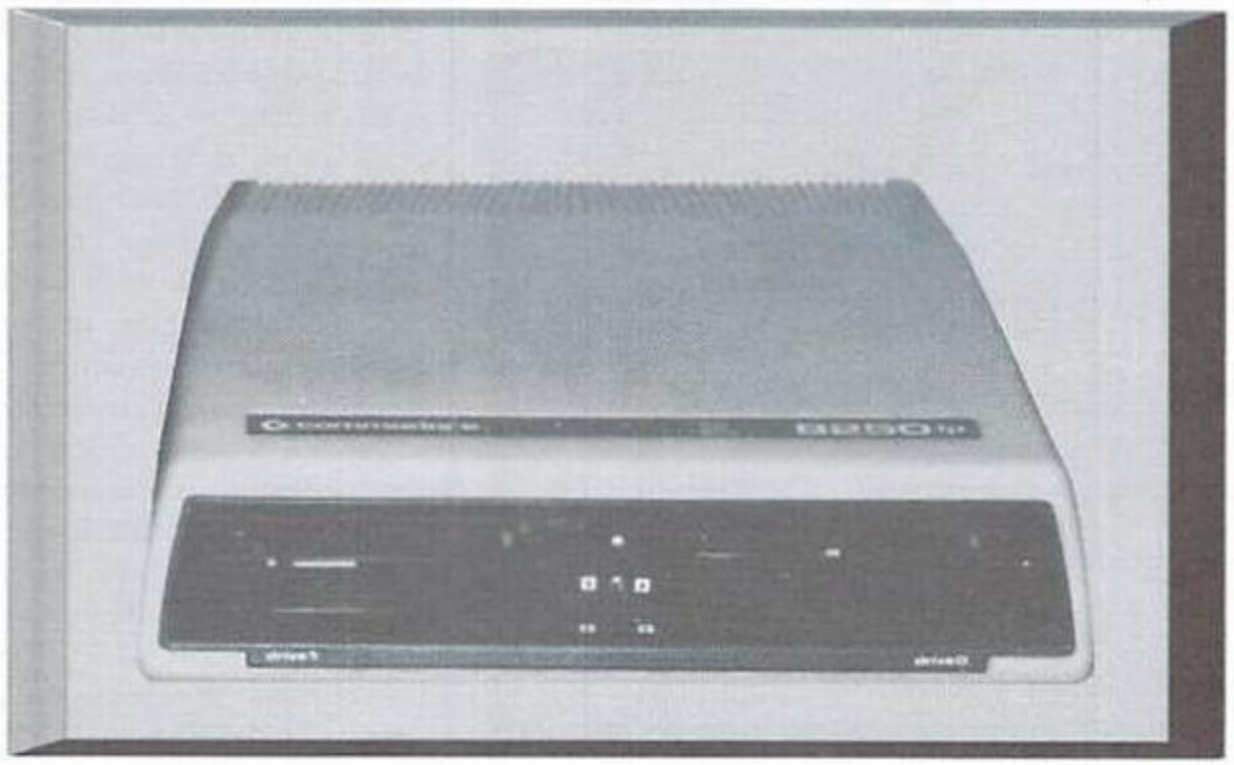
The CBM 3040

Commodore marketed the PET 2001 in Europe with a full size keyboard and the CBM 3000 series. The 2040 was sold as a peripheral for this machine, but it was relabeled as the model 3040 in order to give the impression the drive was made specifically for the European machine. Ironically, the drive did belong with the computer, but both model numbers had to match for buyers to believe it.

The 2040 (and its twin, the 3040) went through two major DOS revisions. The first, version 1.2, merely fixed some timing bugs in the original DOS. The second, version 2.0, first appeared in early 1980 and added the familiar relative file support to Commodore's drive. Other things changed with the introduction of DOS 2.0, but we'll discuss them in more detail when we describe the CBM 4040.

The CBM 8050

As Commodore's second drive offering, the 8050 departed from 2040 compatibility in favor of allowing more storage per disk. Although the 8050 appears identical to the 2040/3040 in



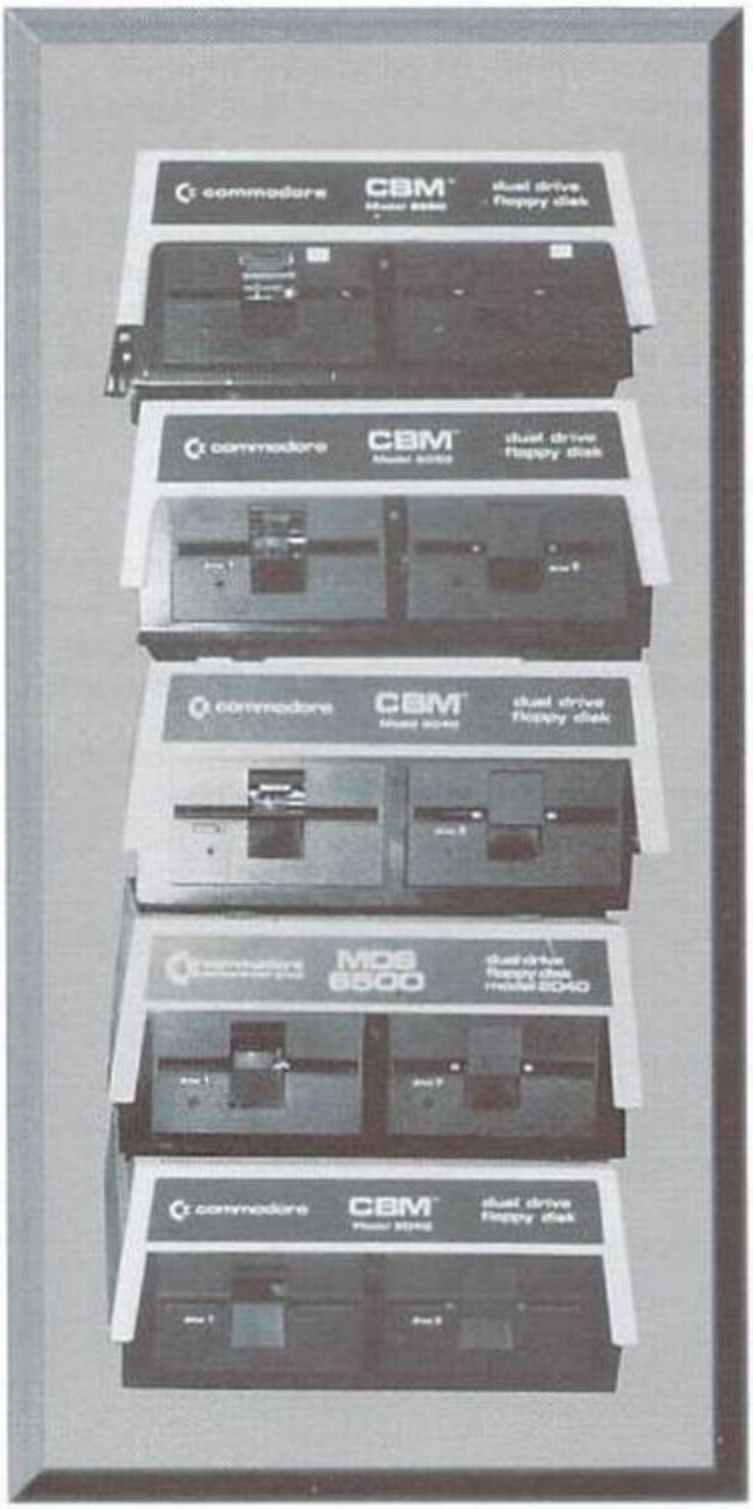
http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

appearance, the drive is drastically different internally. In order to provide more storage capacity per diskette, the 8050 uses single sided quad density Micropolis drives to allow storage of 533,248 bytes per disk. Of that, 521,208 bytes are available for user storage. Interfacing is provided through the IEEE-488 port, with the familiar CBM DOS command set. A query of the DOS version can return 2.1, 2.5, or 2.7, depending on date of manufacture and upgrade status. All DOS versions implement the now familiar relative file type. The 8050 continued the tradition of utilizing two CPUs to handle drive activities, but switched to using two identical 6502 CPU instead of the 6502/6504 combination utilized in the 2040/3040. The 8050 also introduced the bicolor drive status LED. Earlier 2040 units contained a single red LED in the center of the drive front that turned on to indicate an error. The 8050, in contrast, featured a bicolor LED. On power-up, the LED flashed from red to green and back a few times, finally turning green to indicate power. If an error occurred, the LED would turn to red. Introduced in June 1980, the 8050 accompanied the introduction of the new 80 column PET computer, the PET/CBM 8000 series.

The CBM 8061 and 8062

The 8061 and 8062 differ with respect to the most of the other drives mentioned in this article, as they are dual 8" floppy diskette drives. Able to read and write disks formatted in either CBM GCR format or IBM 3740 format, the 8061 utilized single sided mechanisms to store 1.6 megabytes of data per disk, while the 8062 featured double sided mechanisms allowing storage of 3.2 megabytes of data. Other than the fact they were introduced in mid 1980, not much else is known about these units.



The CBM 4040

In late 1980, Commodore created the PET/CBM 4000 series computer system by merging the full keyboard version of the PET 2001 with the BASIC 4.0 found in the 8000 line. Along with the computer introduction, Commodore upgraded the 2040 drive once again to feature relative file support and enhancements found in the 8050 DOS. Dubbed DOS 2.0, The ROM formed the heart of the 2040 drive unit. Commodore renumbered the resulting package the CBM 4040 drive. Externally, only the decal changed to denote the new drive. Internally, the new DOS added fixes and enhancements found in the 8050 DOS, it reduced the capacity of the drive somewhat. While the 2040/3040 drives featured 176,640 bytes of raw storage per disk, the 4040 could store only 174,848 bytes of raw data. Astute readers will note that this is the same storage capacity as the 1540 and 1541 drives and their direct descendants. Users quickly dubbed this the "4040 format", although the 2.0 ROMs had been made available to 2040/3040 drive owners a few months earlier. The 4040 utilized the same dual processor arrangement and CPU types as the earlier 2040/3040 units. Later models of the 4040 came with a slightly upgraded 2.1 DOS version.

The CBM 2031 and 4031

Ever since the introduction of the 2040, PET enthusiasts lamented the lack of a cost effective single drive for the PET line. Finally, in late 1981, Commodore finally produced such a single drive for the PET/CBM line. The 2031 drive resembles one-half of a 2040 drive unit externally. Basically, the system functions just like the 2040, albeit with only unit 0 functioning. A query of the DOS version returns 2.6. Research suggests the 2031 was produced to accompany the PET/CBM 2000 series computers, while the 4031 accompanied the 4000 series PET/CBMs. The two units are identical in all other respects.

The CBM 2031lp and 4031lp

Following the introduction of the 2031 and 4031 drives, Commodore introduced the first serial drive, the VIC 1540. The 2031/4031 and the 1540 share many similarities, and Commodore was well known for cutting costs wherever possible. Research suggests Commodore reworked the 2031/4031 drives to fit in the 1540 case and utilize the Alps half height mechanism used in the 1540. Thus, the 2031LP "low profile" was born. Residing in a durable plastic case measuring 97mm high by 200 mm wide by 374 mm deep, the 2031LP functioned identically in all respects to its predecessor. Initially, the front decal work shared similarities with early plain VIC-1540 decal work, sporting brown decals with white lettering labeled "Commodore" on the left, "single fdrive floppy disk drive" in the middle, and "2031" on the right. Note that no "lp" moniker was shown. Later decal work shares artwork from "rainbow" 1541 decal work, with silver raised "Commodore" on left and "2031LP" on right. To distinguish these models from the earlier ones, the full height 2031/4031 is stated as the HP "high profile" model.

The CBM 8250

In early 1982, Commodore unveiled an enhancement to the 8050 drive. Commodore replaced the single sided drives in the 8050 with double sided mechanisms. This increased user storage capacity to 1,049,782 bytes. To handle the 1 MB* of data storage capability, Commodore upgraded the DOS to version 2.7. This new DOS enhanced the notion of relative files include the concept of "super side

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

sectors". While prior relative file support in Commodore drives contained a maximum number of records per relative file, the addition of super side sectors removed the limit. Externally, only the decal denotes the 8250 unit.

The CBM 8280

As with the 8061 and 8062, the 8280 uses 8" floppy diskettes to store data. Utilizing dual mechanisms stacked atop one another, the 8280 applied an upgrade of DOS 2.7 found in the 8250 numbered DOS 3.0. Each drive allowed storage of 1 megabyte of user data and could read and write IBM 8" disks. The 8280 sported half height or "slimline" drive mechanisms, while the dual 5.25" drives utilized full height mechanisms. Thus, the 8280 resembled an 8250 with the drives positioned top and bottom rather than left and right in the enclosure. Like the 8061 and 8062, not much else is known about this unit. Inference suggests it resembled the 8061 and 8062 and that all three were produced to position Commodore in traditional IBM business markets.

The D9060 and D9090

Long before the Lt Kernel and CMD series of Commodore hard drives entered the market, Commodore itself developed and produced a line of hard drives for the PET/CBM line of computers. Including the new DOS 3.0 found in the 8280, the D9060 and D9090 drives appeared in late 1982 and possibly accompanied the introduction of the SuperPET 9000. The drives are enclosed in 2031/4031 style cases, and contain a mini-"winchester" style hard drive. Nicknamed the "mini-winnies" by Commodore users, the 9060 provided 5 MB of user storage while the 9090 provided 7.5 MB of user storage. Once again, interfacing was provided via IEEE-488, and the 2.7 DOS concept of "super-side-sectors" enabled relative files to span the entire hard drive surface.

The CBM 8250lp

As in the case of the 2031lp, Commodore created a variation of the 8250 using half height drive mechanisms. However, Commodore created the 8250lp for a different reason. Even as the Commodore VIC and 64 home computers started taking a foothold in the market, Commodore created the B series of business computers. These new models, also referred to as the 500, 600, and 700 series, sported molded plastic cases and sleek styling. Clearly, as with the earlier computer introductions, Commodore needed a drive to accompany these new machines in the marketplace. Since no existing drive shared the sleek styling, Commodore revamped the 8250 by designing a new plastic case and utilizing half height drive mechanisms. The new drive, as in the case of the 2031, did not differ functionally from the older 8250. Commodore introduced this drive in 1983.

The SFD 1001

This is the IEEE-488 drive most Commodore users have seen. Commonly mistaken for a VIC/CBM 1541, the SFD 1001 is actually one half of an 8250lp unit packaged in a brown 1541 case. Introduced in June 1985, the decal work resembled the CBM 1541 brown decal work with the silver 1541 and the rainbow in the center. The right side of the decal states the drive is an SFD 1001. SFD stands for "Super Fast Drive", which is misleading, since the drive doesn't run any faster than other IEEE-488 unit. However, to user of the crippled 1541, the drive seems to access data at blinding speeds. To create the 1001, Commodore simply populated a 1541 case with a single 8250lp mechanism and altered the electronics to fit. A query of the DOS version returns 2.7, identical to the DOS in the 8250lp. Instead of rewriting the DOS to eliminate the missing drive 1, Commodore instead shipped the drive with a daughtercard installed that held the infamous "EXCEPTION ROM", which handled all attempted access to drive 1 and returned appropriate errors. Another notable difference between the 8250lp and SFD 1001 is the style of drive mechanism. The SFD uses a turn down door latch, while the 8250lp uses a push down latch.

Conclusion

I hope you have enjoyed this trip down Commodore History Lane. If you've gotten this far, then you must share my interest in researching old Commodore history. Hopefully, this article and the entire series has answered a few questions concerning the CBM drives and how they evolved. However, if you're like me, it also sparked new questions that require answering. I wish I could answer them all, or state with complete certainty all that I have heard or read. Alas, Commodore made documenting its history a less than easy task. Along other things, CBM frequently pre-announced products and then delayed introduction, varied ROM or case versions with changing model numbers, renumbered existing products without upgrading the product, announced products and then failed to introduce them, numbered products differently for differing markets, marketed certain models in only certain markets, and generally confused the readers and users. I suppose each computer manufacturer engages in similar activities, but noting that makes the job no less difficult. I won't say it isn't fun digging for kernels of truth buried in back issues or periodicals and conversations with veteran users, but I'd contemplate trading it all for a reliable source of Commodore historical information. Alas, I haven't found one yet. If you find one, let me know.

Following the article are a sprinkling of notes I have accrued on the various drives mentioned in this articles and some updates to information in the previous article.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Notes

When Did It Start?

Donald Ayers, who compiles The Grassroots Disk Resource, reports that a Texas hobbyist asserts he acquired his 4 KB PET in late 1976, and Ron Snyder, who operated US Commodore Support for many years, mentions that his was picked up at MOS in December 1976 without manuals. Even Commodore Magazine, in its April 1983 issue, page 4, states that the first 8 KB PET was introduced in late 1976. Based on this information, one would surmise the PETs arrived in late 1976/early 1977. However, other sources differ on the date of introduction. Gil Parrish notes that his research establishes a timeline starting in late 1977, while my own personal research reveals the following information: In June 1977 BYTE magazine, Contemporary Marketing, a large marketing firm introduced the PET to the corporate and hobbyist market with a two page spread on pp 92 and 93. In the ad, however, the text reveals that the PET is mentioned in the October 1977 'POPULAR SCIENCE', the February 1978 'Playboy', and the January 1978 'ROM' magazines. This alludes to an introduction in mid to late 1977. Also, in the March 1978 BYTE, the PET is reviewed by a user who indicates he purchased his unit in June 1977 and received it on October 1977. The writer further mentions that his PET is serial number 17. While this information by itself would establish introduction as June of 1977, I do believe Ron Dan and Commodore Magazine to be credible of sources. Therefore, two possible introduction dates— Late 1976 introduction w/December 1976 delivery and June 1977 introduction w/October 1977 delivery— could be used. I have only one problem with the 1976 date. MOS Technology introduced the 6502 in September 1975. At the time, MOS was not owned by Commodore. The span between then and late 1976 when the PET was announced by Commodore seems very tight considering Commodore purchased MOS before the PET was introduced. As well, the MOS Trainer computer, called the KIM-1, only arrived in late 1975, early 1976. The timeline is tight but not impossible. I leave it up to the reader to decide which is the correct date. My past research unearthed not only confusion surrounding the introduction date but also the introductory model. For years, PET enthusiasts have argued alternately that the PET 2001-4K and the 8K model were introduced first.

At last, one mystery seems solved. All of my research coupled with Dan Ayers' information supports the conclusion that pre-ordered PET systems were equipped with 4 KB of RAM, while Commodore ramped up production of 8K units for sale to non-advance order buyers. Therefore, both models can share the title. Commodore committed to producing 4KB units for advance order, while marketing 8KB models to other buyers. Related information supports a reason for this change. Jack Tramel noted that buyers were purchasing PETs quite readily at the $495 pre-order price. Jack is quoted in one reference as deciding to respond by doubling the price of the unit. Since simply doubling the price while leaving all other specifications the same would probably be noted, Jack might have doubled the RAM to squelch such outcry. At the time, 4 KB of RAM did not cost $300.

What is GCR?

Group Code Recording, known more simply as GCR, specifies an disk encoding method that is used by all Commodore disk drives to date except 1581 and its derivatives. In the previous article, I mentioned GCR as a Commodore proprietary encoding. This is untrue. Apple drives and others used the GCR encoding. Commodore (and others) used GCR to ensure data integrity on the diskette. Basically, GCR turns each 4 bit nybble of data into a specific 5 bit sequence that follows two rules: 1. No data sequence contains all '1' bits and 2. There are never more than 2 consecutive '0' bits in a sequence of data.

Following these two rules ensures data integrity on the diskette in at least two ways. First, breaking up sequences of '1' bits allows the drive to use a repeated stream of '1' bits as a sync mark, helping the drive ascertain the location of sectors and tracks. Second, the restriction on runs of '0' bits allows the drive to clock itself from the data received. By examining the time period of high-to-low transitions in the read data stream, the drive can correct its timing to ensure it reads the data exactly as written. Below are the nybble to GCR nybble translations:

nybble	GCR nybble	nybble	GCR nybble
0000	01010	1000	01001
0001	01011	1001	11001
0010	10010	1010	11010
0011	10011	1011	11011
0100	01110	1100	01101
0101	01111	1101	11101
0110	10110	1110	11110
0111	10111	1111	10101

Commodore drives write 260 bytes to disk for each block of disk usage. Converting the GCR yields 325 bytes of data that are actually written to disk. Who invented GCR is uncertain. Some credit Steve Wozniak (the 'Woz' of Apple II fame) as the creator, while others note that both the 'Woz' and CBM simply utilized an already present standard in their drives. Again, the proof is left as an exercise for the reader.

The DOS Versions

Throughout the years, Commodore has enhanced and upgraded the Commodore drive DOS many times. Below is a list of the various DOS versions and what each brought to the table:

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Number	Description	Drive(s)
1.0	Original CBM DOS. No relative File Support	2040,3040
1.2	No Rel. File support. Bug and Timing fixes	2040,3040
2.0	Relative File Support	2040, 3040, 4040
21	bug fixes	4040, 8050
25	bug fixes	8050
26	single drive mods, 1 CPU & less RAM	2031, 4031, 2031 lp, 4031 lp
26	IEEE-488 mods replaced with serial mods 1540, 1541, 1541C, 1542, 1541-II	
26 TDISK	Extra commands, support for parallel mods, interface	1551
27	super-mods setter support	8050, 8250, 8250lp
3.0	hard drive enhancements	D9060, D9065, D9090
3.0	burst mode support, double sided disk support, MFM	1570, 1571, 1571CR

All of the dual drive units featured the parallel CPU arrangement. Only the IC's themselves changed. The 2040/3040/4040 drives featured a 6502/6504 combination, while the 8050/8250/8250LP drives each used 2 6502 CPUs. Although stated in the article that each drive contains two CPUs, technically each contains 3 CPUs. One CPU, the 6532, specializes in translating the 8 bit data into 10 bit GCR codes (See 'What is GCR'). Each drive except the 8250LP uses full height drive mechanisms with push down door latches, and each contains a built in power supply.

Of the two main processors in the system one handled the 'Interface Processor' (IP) task, while the remaining general purpose CPU handled the 'Floppy Disk Controller' (FDC) task. The two processors operated through various I/O ports.

IEEE-488 peripherals are attached to the PET/CBM computers in a daisy chain fashion much like the Commodore serial peripherals. However, unlike the serial peripherals, not all of the connectors are identical. The IEEE-488 port terminated at the rear of the PET/CBM computer in a 12/24 card edge connector (much like the Expander user port of the VIC, 64, and 128). The drives, on the other hand, used the traditional IEEE-488 24 pin cable end that resembled a small version of a 'Centronics' parallel printer connector. To attach any of the IEEE-488 drives to a PET/CBM machine, a special card edge to IEEE-488 connector. This cable, called a 'PET to IEEE' cable is referenced by part number 3201. To chain one peripheral to another on the IEEE-488 bus, a cable called an 'IEEE to IEEE' cable is required, P/N 900780. All IEEE-488 peripherals contain only one connector on the rear of the unit. Each IEEE-488 cable connector was constructed as a pass through. Users simply screwed each new cable to the rear of the previous cable connector. More than one PET/CBM computer can be connected at one the IEEE-488 bus, as long as only one uses the bus at any time. As well, a theoretical maximum of 12 devices can be attached to the bus, although the number is lower in reality and dependent on circuit driver capabilities.

The CBM IEEE-488 interface allows transfers of 1200 bytes/second. It is uncertain whether that is due to the IEEE-488 specification or Commodore's transfer routine inefficiencies.

2040/3040/4040

The 6504 CPU handled the IP task in the these units. Accompanying the disk drive was a manual 'User's Manual for CBM 5 1/4-inch Dual Floppy Disk Drives' P/N 320399 and a 'TEST/DEMO' diskette P/N 4040037. I suspect the disk P/N had been updated since it contains a drive model number in the number. An earlier version of this disk would likely have the prefix 2040 in the part number.

Of the three drives, the 3040 and the 4040 could be used in international markets with 220 volt power. This suggests that the lineage progresses from 2040 (US version) to 3040 (US and International) to 4040 (2.0 ROMs, US and Intl.) Even though 2040/3040 owners could purchase 2.0 DOS ROMs for their drives, all Commodore literature assumes 2040/3040 owners have not upgraded or that those who did would refer to their drive as a 4040.

The format of the 2040/3040 differs from the 4040 format in a subtle but substantial way. Tracks 1-24 on the 2040/3040 each contain 20 sectors, while on 4040 (and 1541 et al) track 1-24 only allows 19 sectors per track. This gives the 2040/3040 the ability to store 8 more directory entries (extra sector on track 18) for a total of 152, as well as 6 more blocks of data per disk. Subtracting the 176640 bytes of raw storage on the former drives from the 174848 bytes of raw storage available on the latter drive and dividing by 256 yields the extra 7 block of data storage. Users reported problems with the drives concerning tracks 1-24. Commodore traced the problem to the marginal end of track header gap on some sectors. Thus, when CBM introduced the 4040, they downgraded the sectors per track on that track span to leave adequate header gaps. Subsequent reads and writes did not care how the track was laid out. This enabled 4040 users to read and write 2040 disks and vice versa. The only caveat was in accessing the extra sectors on a 4040 drive. Although Commodore could have simply programmed the 4040 DOS 2.0 to simply refuse to access the extra sectors, I suspect that would have angered many 2040 drive owners who upgraded. Without either drive to confirm my suspicions, I would be interested to hear from anyone who could verify if CBM did simply refuse to handle the 2040 sectors or if the 2.0 DOS contains special code to allow reading of these sectors. The 2040 could read 4040 disks fine, but writing to them was iffy, unless the 4040 BAM marked the nonexistent extra sectors as used. Even then, a validate would free them and render future writes dicey at best.

When turning on a 2040/3040/4040 drive, instructions ask the user to open both drive doors before applying power. Upon power up, all three red LEDs should flash briefly and then go out. Since the usual head solenoid has been eliminated from the drive mechanisms, turning on the power with drives closed and disks inserted can result in data being erroneously written to disk.

Drive line using Shugart SA 390 drive mechanisms

On the test demo diskette, a program called RANDOM1.00 appears. While the program works fine for DOS 1.X owners, the program never did work for 4040 (DOS 2.0

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

users. The 2031 Test demo diskette contains a working copy of the program called RANDOMEXAMPLE To kill auto-initialization on 4040, send following to command channel: "in"chr$(243)chr$(16)chr$(1)chr$(1).

2040/3040/4040 use a 9 GCR byte header gap, while 1541 (during 4040 format), uses 8 GCR bytes. SX64 drive ROM changes this back to 9 GCR bytes. The 2040 with DOS 1.0 does not write a dummy data block out for each track and sector combination during format. RDOS 1.2 and later write 256 null ($00) bytes.

In the directory track, a 2040/3040 writes a $01 (meaning DOS 1) to location $02 in the first block of BAM, while the 4040 writes a 65 ('A' meaning 4040 format). On the 4040, locations 165-166 contain the similar 'A' which means DOS 2, 4040 format. All three drives locate the directory on track 18, as expected.

8050

In the dir block, an 8050 writes a 67 ('C' meaning 8050 format) to location $02 in the first block of BAM. On the 8050, locations 27-28 contain 'C' which means DOS 2, 8050 format. Accompanying this drive was a manual User's Manual for CBM 5 1/4-inch Dual Floppy Disk Drives' P/N 320899 and a TEST/DEMO diskette, P/N 8050C05C.

Initially offered with Mpi/Commodore mechanisms, Commodore switched to Tandon mechanisms for more reliability. However, unexpected problems stemming from increased speed of Tandon drives caused CBM to revert back to Mpi/Commodore mechanisms. Mechanisms can be identified by the location and color of the drive activity LED. Mpi/Commodore mechanisms use a green LED mounted above the disk slot on while Tandon mechanisms contain a red LED below the disk slot. Commodore tried two version of Tandon mechanisms. Later Tandons contain a drive door switch to activate motor upon disk insertion. Mpi/Commodore mechanisms continue to activate disk motor as drive door is closed.

This difference caused confusion among 8050 owners. To properly seat a disk in a mechanism without a motor activation circuit of some type, the user was instructed to partially close the drive door a couple of times before fully closing. This process was called "teasing" and helped to move the disk over the center of the spindle. Drives with motor circuitry, like the Mpi/Commodore and later Tandon mechanisms, would not seat properly if the disk was "teased". The 8050 was initially offered for $1795. On the 8050, a format takes 2 minutes.

To change the device number via software (command channel): "m-w"chr$(12)chr$(0)chr$(2)chr$(NA+32)chr$(NA+64) NA = new device number.

ROMs:

UA6	901467-01
UL1	901887-01
UA11	901888-01

UL1 and UA11 most likely contain the Interface Processor code, with UA6 containing the Floppy Disk Controller code.

ROM revisions: (specify revisions to UL1 and UA11 ROMs) -03, -04 miscellaneous bug fixes -06, -07

Ensure more reliability in copying disks in either direction if two relative files with same record length are open at once—one reading and one writing—data may go to wrong file. The former is a short delay loop between reading and writing. If users use built in COPY command to copy one disk to another, drive quits after copying eight files. Former cure is to use the COPY program instead.

8061 and 8062

While it is known that these drives would read and write the IBM 3740 disk format, little is known about the disk format, and not much more is known about these drives. Evidently, they either were not well received by PET users or Commodore downplayed their existence, as they received no further mention after introduction.

2031/4031

The 2040 with DOS 1.0 does not write a dummy data block out for each track and sector combination during format. Later ROMs and drives write 256 null ($00) bytes. Strangely, a bug in DOS 26 causes 154X drives to write 1 $4b and 255 $01 bytes instead. It is unknown whether the DOS 26 in the 2031 exhibits this same behavior. The 2031 and 4031 use Shugart SA390 mechanisms. Early units may completely format a disk at times. Fix involves hardware addition of a transistor to circuit board. Commodore initially offered the 2031 for $695.00. This drive line reduced the activity lights to a single drive LED. ON meant in use, flashing meant error.

2031, like the 1541, contains 2 KB RAM buffer, a lesser amount than the dual drives, which each contained 4 KB. Some suggest that the drives almost 50% reduction in transfer speed is caused by this, while others allege that the loss of a CPU and the need to create a Data Transfer rate half of earlier drives.

Fred Bowen alleges that the 2031 was created after the 1540 by replacing the serial transfer routines with their IEEE counterparts. Other sources differ. I find it hard to believe that Commodore would rip out IEEE code and then replace it later. I suspect that the 2031 and 1540 were developed simultaneously or within a small time frame and Commodore simply applied the appropriate DOS enhancements to whichever drive needed them.

2031 LP/4031 LP

It is believed the LP models used Alps mechanisms. The case style is identical to off-white 1540 or 1541, with the exception of a IEEE-488 connector instead of dual serial DIN connectors at back.

8250

Introduced for $2195.00, Commodore once again tried Tandon mechanisms with the 8250, as they were up to 7 times faster than Mpi/Commodore. The enhanced operation had caused problems in the 8050, but Commodore developed fixes to combat the problems. If a user inserts an 8050 disk into a 8250, access of the disk returns the error "ILLEGAL TRACK OR SECTOR". The manual instructs users to ignore this. To change the device number via software, issue the following to the command

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

dnamelmmwdw$0 2)dw$0)dw$0)dw$(NA+32)dw$(NA+64)
NA = new device number.

8250LP

At one time, Commodore started some case styling designs from the Porsche automobile styling department. Nothing ever came of the designs, but rumors about a new 'Porsche' PET surfaced. The rumors persisted and many claimed they described the B series computers from Commodore. Commodore denied the connection. Nonetheless, the name stuck. As a result, many refer to the 8250LP, which accompanied the B series, as a 'The Porsche PET drive.'

8280

This drive cannot be found in any periodicals, but this model does exist. Research suggests it was only produced in Europe.

D9060 and D9090

The D9060 originally sold for $2995, while the D9090 sold for $3495. The mini-winchester drive in the D9060 contained two platters with 2.5 MB of storage per platter, while the D9090 added a third platter. Since the D series shipped with DOS 3.0 and used the new super-side-sector technique to get restrictions on relative file sizes, each drive shipped with a utility to allow the drive to emulate the older style of relative file support. Internally, both can transfer data at 5 MB per second. Brett Tabke states that both drives were made by Tandon for CBM.

Jim Butterfield notes that the drives were usable, but warned about attempting to issue a validate on the disk. Brett Tabke states that he was able to crash the drive once. His research narrowed down the bug to the following conditions: more than 244 files on disk and more than 1 split file.

When the bug does appear, the BAM is written to the first track of the directory and is corrupted, making recovery difficult. Brett notes that disks without relative files or split files were safe for validation, and the long standing rule of thumb was to move split files off to the end of the directory.

SFD 1001

Brett Tabke notes that this unit bears many similarities with the 8250LP. It uses one 8250LP drive mechanism and contains the same logic on board. Brett further states that Commodore removed the drive 1 in this unit much more cleanly than in previous single drive versions by adding a ROM to the unit. This ROM previously referred to as the 'EXCEPTION ROM' trapped all access to the missing drive 1. Unlike the 1541, which returns a 'DRIVE NOT PRESENT,' the SFD 1001 returns 'DRIVE NOT READY.' Brett says that users can turn a SFD1001 back into a dual drive with a bit of work.

The Mystery Drives:

2040A/2041

Numerous ads mention both drives as single drive versions of the 2040 as early as October 1979. Each ad mentions that this drive will be available in June 1979. Since no drive with this description appears in June 1979, I conclude this drive was shelved. An ad by 'Communications Electronics' in that time frame details the 2041 in some depth. I quote: 'This is a single floppy disk drive which attaches to the memory bus of the PET 2001-32 or 2001-16. It is not as fast as the 2040 because it does not have its own microprocessor system to buffer data while the main PET is functioning.'

A disk operating system is provided in (2) 6332 ROMs which are inserted into already existing sockets on the PET 2001-32 or 2001-16. Additionally, one existing 6332 is replaced by another ROM provided with the disk.

Disk Drive

Shugart Associates SA 390 Drive. Standard mini-floppy power for the drive is provided from the PET 2001. The disk operating system addresses the 2041 by the same commands as the cassette operating system. It is referenced as device #4. Diskette format is compatible with the 2040 as is all software and commands. The 2041 intelligent mini-floppy has a net storage of 170K bytes. The introductory price was set at $595.00.

In the last article of this series, I implied that the 2041 might have bridged the gap between the 2031 and the 1540. With this new information, I think that's unlikely. Perhaps the 2040A/2041 lent some design ideas to the 2031/1540, but I am now convinced that that 2031 and 1540 were developed separately off the 4040 dual drive unit.

2081

One contact reported the existence of a single 5.25" drive listed as model number 2081. No other information on this drive has been found. This could be another number for the 2031 disk drive while it was under development.

4040LP

Research suggests this was to be a 4040 unit in the same case as the 8250LP. However, information implies that this drive never made it past the prototype stage.

8060

George Page mentions this drive as a 750 kilobyte predecessor of the 8061 dual 8" drive. If this drive does exist, it would likely read the same IBM 3740 disk format as the 8061.

8070

I have a passing reference to this drive from George Page who describes the 8070 as a dual 8" drive similar to the 806X line. No more information is available at this time.

D9062

This unit, a prototype that never made it to market, can be described simply as a dual D9065.

D9065

The D9065 is a 7.5 MB hard drive. It never made it past the prototype stage. Since I don't understand why Commodore would reintroduce a 7.5 MB HD after the D9090 appeared, I can only guess this drive either features some new DOS version or is really a prototype of the commercial D9090.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

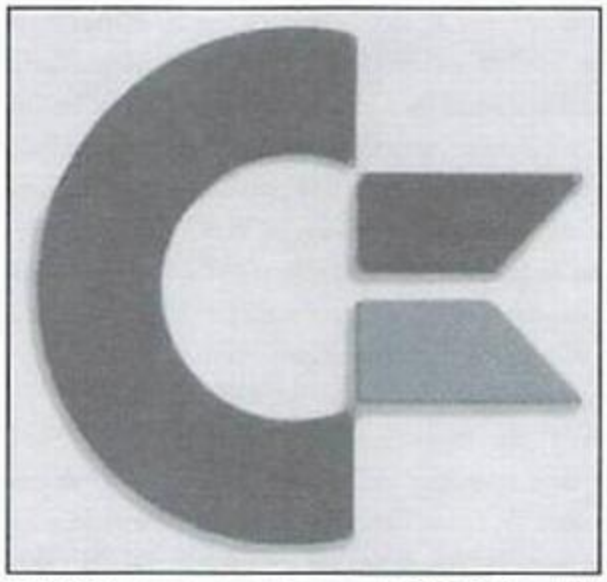
http://www.oldgamesitalia.net/

Just For Starters

by Jason Compton

GETTING TO KNOW THE SUPERCPU

It's a common adage that power corrupts, and that absolute power corrupts absolutely. In the right hands, however, power can be a wonderful tool. CMD's SuperCPU is a valuable source of power, but you may want a few pointers before you commit yourself to buying one—or, if you've made up your mind, you might want a little help to make the most your new power.



What IS the SuperCPU?

The SuperCPU is a metal enclosure that attaches to your C-64 or 128's cartridge expansion port. It is somewhat taller than your computer, about two inches deep, and is as long as possible without blocking any additional expansion ports on your computer. Inside the box is a Western Design 65816 CPU and JiffyROMs specifically designed for the SuperCPU. The 65816 chip replaces the function of the computer's original CPU brain chip. The JiffyROMs give your SuperCPU machine its own JiffyDOS, which replaces any JiffyDOS you may or may not have installed in your machine at present.

The SuperCPU requires no configuration software. Basically, it is a "plug and play" peripheral, as most are on the 64. However, there are a few user-configurable switches on the unit itself. The "unit enable/disable" switch, is exactly that—when you place the switch in the "enable" position, upon powering up or resetting, the SuperCPU will be active, replacing your 64's CPU with its own 65816. Note that this switch only takes effect when you power up or reset your computer—you cannot disable or enable the SuperCPU's operation entirely on the fly.

The second switch controls the JiffyDOS functions and can be toggled on the fly. With the switch in the "enable" position, you will have access to the JiffyDOS wedge and shortcuts while using your computer, and disk access will be greatly improved for any JiffyDOS devices. If you find this is problematic for certain applications, you can simply shut off JiffyDOS' operation. Switching off JiffyDOS returns you to the standard 64 DOS, which is relatively slow, but sometimes necessary to use.

The third switch controls the speed of the SuperCPU. In the "Turbo" position, the switch makes the SuperCPU operate in 20MHz (MegaHertz) mode (your computer typically operates at 1MHz). It sounds pretty good, but before you get too excited, it should be pointed out that in almost no event will you actually get a speed increase of a factor of 20. The reasons are technical, but it suffices to say that it is a consequence of diminishing returns—the more you speed up the machine, the less you see a continued improvement for each added unit of speed. Although, the performance at 20MHz is nothing to sneeze at. Some programs do not function properly at 20MHz, so you can use the speed switch in the "normal" position to make the SuperCPU function at 1MHz.

The last two details on the SuperCPU are the Turbo light and the reset button. The Turbo light will be illuminated when the SuperCPU operates at 20MHz, and will go out when you switch to 1MHz, disable the unit, or are accessing the disk (all disk access has to run at 1MHz). The reset button will reset the computer, but you need to hold it for more than half a second or so. Any less than that, and the button acts like the "restore" key.

At present, the SuperCPU is only available for the C-64. For C-128/128D users, this means that when the SuperCPU is enabled, you will automatically boot in C-64 mode. You can get to 128 mode only by disabling the unit. CMD plans to make a 128 version of the SuperCPU available—it will be an add-on board for SuperCPUs, containing an extra MegaByte of memory and the logic necessary to make the SuperCPU function in 128 mode as well as 64 mode.

Getting Ready To Rumble

If you're ready to install your SuperCPU, you should first read through the manual to be sure you fully understand what you're about to do for your machine. The manual discusses software and hardware compatibility in detail. For your trial run, I recommend that you disconnect and set aside all of your special peripherals—anything in the user port, anything in the cassette port, etc. Even though the SuperCPU has a cartridge port pass through, I recommend leaving it empty while you test your SuperCPU. You may leave as many disk drives attached as you like as their presence shouldn't affect your tests.

When you remove the SuperCPU from the antistatic wrapping, check to make sure that all of the toggle switches are in the optimal configuration: unit enabled, JiffyDOS enabled, Turbo enabled. Carefully plug the unit into your cartridge port, and switch your system on. Warm up the monitor for a few seconds first because you'll see a special SuperCPU boot animation come on-screen. This will happen whenever you switch your machine on with the SuperCPU enabled, or whenever you perform a reset which enables the SuperCPU after it has been disabled. After the animation, you should be at a BASIC prompt much like those you've seen many times before, slightly altered for the SuperCPU DOS with a 1996 copyright. If you've gotten this far, congratulations—you own one of the fastest Commodore 64's in history.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Testing Your Wings

Now that you're ready to fly, you need to find something that will make your computer soar. It's a well-established fact that the SuperCPU will greatly enhance GEOS, so if you want a sure-fire example of the new power at your disposal, you can get your GEOS 2.0 up and running under the SuperCPU. It's not as simple as just booting GEOS in Turbo mode, however. GEOS needs support software to take advantage of the SuperCPU. The SuperCPU manual spells out the process in detail, which basically involves booting GEOS with turbo off, installing a special patch on your GEOS boot disk (the patch is included on a 1541-format disk), and installing special patches if you are using a 1351 mouse or CMD SmartMouse/SmartTrack. After this process, you can reset your system and, if all went well, reboot GEOS in Turbo mode, with a great speed increase. The patched mouse/trackball drivers allow you to disable turbo mode on the fly. Quick plug for lightpens: there's no special driver needed and the Inkwell light pen continues to operate like a champ at 20MHz. This process may take a few minutes, but when you're done, you'll have a GEOS setup that snaps up windows and menus instantly and operates a whole lot faster than you've ever seen before. The SuperCPU is highly compatible with GEOS software, and you'll probably get a much better feel for the operating system if you were previously not a big fan.

There are other ways to take advantage of the SuperCPU as well. If you have non-GEOS productivity software, it's very likely to work properly at accelerated speeds. The most likely hiccups will come in the form of failures to load, or lockups on disk access. Generally, these problems can be alleviated by disabling turbo mode for disk access on booting, loading, and saving, and in more extreme cases might require you to disable JiffyDOS as well. These latter cases are very rare.

If you enjoy music on the 64, you'll be pleased to know that in almost all cases, it will still play loud and clear on the SuperCPU. Generally, the only music that will sound incorrect at accelerated speeds will be that which includes digitized samples, as some sample players are CPU speed sensitive. At 20MHz, the most brilliant sample from your 1MHz setup will sound like a squeak if the player is not properly written.

Games are an entirely different story. Depending on the way a game is written, the SuperCPU might make it a joy to play, because the gameplay is enhanced by being significantly faster. On the downside, the SuperCPU may render the games impossible to play, because either it is entirely too fast, or the game runs improperly at the high speed. In the most extreme cases, the game may fail to work at all. It's up to you to decide how much time and effort it is worth to try to find the perfect mix of SuperCPU use to get games working optimally—knowing that some will simply never work right.

The easiest games to test on the SuperCPU are cartridge based games because loading is effortless and instantaneous. Game cartridges themselves cannot be addressed at 20MHz, but often the cartridge data is loaded in the 64's RAM and run from there. This means the SuperCPU can operate at 20MHz after the cartridge is loaded. Two case studies worth considering: Omega Race on cartridge gained a small amount of speed, enough to make the game smoother to play (although it's almost perfectly faithful to the original already), but it did not become ridiculous; Tapper is entirely too fast at 20MHz: beer glasses fly down the bar with dizzying speed.

Once you leave the cartridge games behind and start loading them from disk, a whole new world of potential difficulty opens up. Disk-based copy protection often employs a great deal of tricks, which can include using undocumented (or "illegal") CPU instructions. These instructions work properly on your computer's original CPU but the 65816 was not designed to work the way the undocumented instructions expect. These schemes will almost always lock up your computer. Other schemes will not work properly at 20MHz, but you can get around that problem by booting in non-Turbo mode, then enabling Turbo after the game begins. Still others might have a problem with JiffyDOS, which will require you to temporarily disable it as well.

The good news is that once you clear copy protection, games tend to be much more cooperative. It is fairly rare for actual in-game code to use undocumented instructions, so switching to Turbo mode is safe. However, many games use their own custom disk-loading routines which can cause problems with Turbo mode. If you find that games lock up whenever disk access normally occurs, you may want to try re-running the game but disabling turbo mode before the disk access happens. In games where the disk access is easy to predict, this can be fairly simply. In others, where it's not at all clear when disk access might occur (games with random events that load from disk, or programs like Flight Simulator, where it might load from disk at any time), you may simply have to roll the dice and hope you get lucky.

There is a saving grace for some games, however. Certain custom loading routines are "smart" in that they will not lock up the machine if they fail to load the first time. Instead, they think there has been a disk error and prompt you to try again. Games like Access' Echelon, a space flight simulator, or Electronic Arts' Project Firestart fit this description. You can use Turbo mode with impunity, but when you're prompted to replace the disk, just switch off Turbo, let the data load, then re-enable Turbo mode.

There is another way around disk based copy protection failures with the SuperCPU. If you have a freezer cartridge, the freezing capability will be incompatible with the SuperCPU while the SuperCPU is enabled, but if you disable the unit entirely the freezer will work normally. Once you clear the copy protection, freeze the game and save it off to another disk. This frozen image can be re-loaded under the SuperCPU later.

Setting Up Peripherals

Once you're comfortably up and running with the SuperCPU, you can think about adding any external peripherals to your system. Most of them will be compatible with the SuperCPU, but just to be sure, try each one with the SuperCPU without any of the others plugged in, just to isolate any problems. There is a list of known incompatible hardware in the SuperCPU manual. The most notable of these are the RAMDrive and the Action Replay. These will still work if the SuperCPU is disabled, but fail once the unit is enabled. Other supercartridges will generally work, but you may run into conflicts over JiffyDOS and the supercartridge disk access, and freezing will not function.

Final Notes

Here are a few pointers about a SuperCPU system:

Putting the SuperCPU in "Normal" as opposed to "Turbo" mode is NOT the same thing as disabling the SuperCPU. Normal mode runs the 65816 CPU at 1MHz, while disabling the SuperCPU means that the 65816 is not active at all, and your computer's CPU is operating instead.

If you have JiffyDOS installed in your computer already, the SuperCPU JiffyDOS supercedes it when the SuperCPU is active. If you switch off the JiffyDOS on the SuperCPU, you will be using the original DOS, not the JiffyDOS installed in your computer. Those JiffyROMs only become active again if you disable or remove the SuperCPU itself.

You can make the SuperCPU work for you and others. CMD has some programming tips that range from simple to in-depth to show you how to make programs take better advantage of the unit.

If you own Echelon or Total Eclipse, you're in for a real treat, as these games look stunning on the SuperCPU. If you own Elite, you're in for a real challenge as the game plays entirely too fast for comfort.

The SuperCPU is a complex beast which has a lot of implications for your 64. It's worth a serious look, and if you own one, it's worth some time and effort to discover the software that works best on it.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

CMD • HARDWARE • ORDERS: 1-800-638-3263 • SOFTWARE • CMD

HD Series SCSI Hard Disk Drives

HD-40 (40 MB)	$249.00
HD-170, 170 MB (Special Edition)	$299.00
HD-500, 500+ MB (Special Edition)	$379.00
HD-1000, 1 GB (Special Edition)	CALL
HD-2000, 2 GB (Special Edition)	$659.00

FD Series 3.5" Floppy Disk Drives

FD-2000 (800K and 1.6 MB)	$159.00
FD Real-Time-Clock Option/Kit	$20.00/$29.00
Box of 10, High Density Disks (1.6MB)	$14.95
Box of 10, Enhanced Density Disks (3.2 MB)	$29.00

JiffyDOS

(Specify computer serial number and drive model)

JiffyDOS C64/SX-64 System	$39.00
JiffyDOS C-128/128-D System	$49.00
Additional Drive ROM's	$19.00

Miscellaneous Hardware

80-column Monitors (Refurb)	CALL
Aprotek 3-Way User Port Expander	$30.00
Aprotek User Port Extension Cable	$19.00
C-64 Computer (Refurb, w/JD)	$99.00
C-64C Computer (Refurb, w/JD)	$119.00
C-64/64C Power Supply (Repairable)	$39.00
C-64/64C Heavy Duty Power Supply (Repairable)	$56.95
128-D Computer w/ Int. 1571 (Refurb, w/JD)	CALL
C-128 Computer (Refurb, w/JD)	$179.00
C-128 Computer (Refurb, w/JD, no PS)	$129.00
C-128 Power Supply (Repairable)	$56.95
Cannon BJC-4100 Color Bubble Jet Printer	$349.00
Commodore 1541 Disk Drives (Refurb, w/JD)	$89.00
Commodore 1541-II Disk Drive (Refurb, w/JD)	$109.00
Commodore 1571 Disk Drive (Refurb, w/ JD)	$119.00
Commodore 1702 40-column Monitor (Refurb)	$79.00
Commodore 1802 40-column Monitor (Refurb)	$139.00
CMD EX2+1 3-Port Cartridge Port Expander	$34.95
CMD EX3 3-Port Cartridge Port Expander	$29.95
CMD Gamepad/Joystick Controller	$24.95
CMD GeoCable II Print Cable 6ft./15ft.	$29.00/$34.00
CMD SmartMouse (1351 Compatible Mouse)	$49.95
Inkwell Light Pen Model 170C	$75.00
Monitor Cables	CALL
Mouse Pad	$2.95
MW-350 Printer Interface (0K/8K Buffer)	$49.00/$60.00
Panasonic KXP-1150 9-pin Printer	$169.00
Panasonic KXP-2023 24-pin Printer	$229.00
Panasonic KXP-2135 24-pin Color Printer	$319.00

Utilities

Big Blue Reader V4.10 (SOGWAP)	$39.00
CMD Utilities	$24.95
JiffyMON-64 (ML Monitor)	$19.95
The Compression Kit '94 (Mad Man)	$39.00

GEOS

Colette Utilities (Handy Geos Utilities)	$19.95
Desk Pack Plus	$29.00
Dweezils Greatest Hits (NewTools2,Stamp,Label128)	$30.00
FONTPACK Plus	$25.00
gateWay 64 or 128 (Specify Version)	$29.95
geoBASIC	$20.00
geoCalc 64/128	$40.00/$45.00
geoChart	$29.00
geoFAX	$39.95
geoFile 64/128	$40.00/$45.00
geoMakeBoot (Makes Bootable copies)	$12.95
geoProgrammer	$45.00
geoPublish	$40.00
GEOS 64 v2.0	$44.00
GEOS 128 v2.0	$49.00
geoSHELL V2.2 (CLI for GEOS)	$24.95
International FONTPACK	$25.00
Perfect Print LQ for GEOS (Laser-like output)	$49.95
RUN GEOS Companion	$20.00
RUN GEOS Power Pak I or II (Specify)	$20.00

Books

Anatomy of the 1541	$8.00
C-64 Science & Engineering	$8.00
C128 Computer Aided Design	$8.00
C128 BASIC Training Guide	$8.00
Commodore 64 Tricks and Tips	$8.00
GEOS Programmers Reference Guide	$8.00
Graphics Book for the C-64	$8.00
Hitchhikers Guide to GEOS	$8.00
Ideas for Use on Your C-64	$8.00
Printer Book for the C64	$8.00
Mapping the C64	$8.00

Scanning & Video

Handyscanner	$249.00
Pagefox	$139.00
Video Digitizer	$169.00
Videofox	$89.00

SuperCPU-64 Accelerator.....$199.00

RAMLink Power-Backed RAM Disk

RAMLink Base Model (0MB, No RAMCard)	$149.00
RAMLink w/1 MB RAMCard (Special!)	$189.00
RAMLink w/4 MB RAMCard (Special!)	$229.00
RAMCard RTC Option/Kit	$10.00/$19.00
RAMLink Battery Back-up (Optional)	$24.95
Parallel Cable (RAMLink to HD)	$14.95

MIDI & Sound

Digimaster	$34.95
SID Symphony Stereo Cartridge	$44.95
Sonus 64 Sequencer, MIDI Interface, Cables	$99.00
Sonus 128 Sequencer, MIDI Interface, Cables	$99.00

Languages & Compilers

BASIC 64 Compiler (Abacus)	$17.00
BASIC 128 Compiler (Abacus)	$25.00
Blitz! 64 Compiler (Skyles)	$30.00
Blitz! 128 Compiler (Skyles)	$30.00
Buddy 64/128 Assembler	$39.00
Cobol 64 (Abacus)	$17.00
Fortran 64 (Abacus)	$17.00
Pascal 64 (Abacus)	$17.00

Productivity

Cadpak 64 (Abacus)	$22.00
Cadpak 128 (Abacus)	$25.00
Chartpak 64 (Abacus)	$17.00
Chartpak 128 (Abacus)	$25.00
Data Manager 64 (Timeworks)	$16.00
I Paint v1.5 (128, 80-col., 64K VDC) (Living Proof)	$39.00
I Port v1.54 (128, 80-col., 64K VDC) (Living Proof)	$29.00
Personal Portfolio Manager (Abacus)	$16.00
Pocket Writer 1 (64) Digital Sol.)	$35.00
Pocket Writer 2 (64/128) (Digital Sol.)	$65.00
Pocket Writer 3 (64 or 128) (Digital Sol.)	$70.00
Pocket Planner 2 or Pocket Filer 2 (Digital Sol.)	$35.00
RUN Productivity Pak I, II, or III (Specify)	$15.00
RUN Super Starter Pak 1541 or 1581	$20.00
RUN Works	$20.00
SEC Check Register 128	$50.00
SuperScript 64 (Precision)	$15.00
SuperScript 128 (Precision)	$20.00
Superbase 64 Version 3.01 (Precision)	$35.00
Superbase 128 Version 3.01 (Precision)	$35.00
SwiftCalc 64 (Timeworks)	$16.00
TWS 64 w/Speller (Busy Bee)	$29.00
TWS 128 w/Speller (Busy Bee)	$39.00
TWS Modules (HD/RL/Ilustrator)	each $5.00

Telecommunications

Aprotek MiniModem C-24 (C= ready, 2400 baud)	$69.00
Aprotek MiniModem C (C= ready, 1200 baud)	$50.00
Aprotek Com-Modem Adapter (for ext. modem)	$19.00
Aprotek Com-Modem Adapter Cable	$9.95
BOCA V.34 33.6K bps FaxModem	$169.00
BOCA V.34 w/Turbo232 & Cable	$199.00
Commodore 1670 Modem (1200 baud)	$14.95
Dialogue 128	$29.00
Nova Term Version 9.6 ON DISK!!!	$29.95
Turbo232 Cartridge (Up to 115K baud)	$39.95
Turbo232 Modem Cable (DB9-DB25)	$9.95

Games

Atomino	$17.00
Ballistix	$13.00
Blood Money	$15.00
Chomp!	$10.00
Day in the Life of Prehistoric Man	$19.00
Escape Route	$19.00
Flummi's World	$19.95
Heavenbound	$19.95
Island of the Dragon	$19.00
Lazer Duel	$14.95
Lions of the Universe	$19.95
Mainframe	$13.00
Menace	$15.00
Navy Seal	$10.00
Rings of Medusa	$16.00
RUN C128 Funpak	$10.00
RUN C64 Gamepak	$10.00
Shoot 'Em Up Pack (Gangster/Time Traveler)	$14.95
Skate or Die	$13.00
Slaterman	$14.95
The President Is Missing!	$10.00
The Three Stooges	$10.00
Tie Break Tennis	$16.00
Total Eclipse	$10.00
Walkerz	$19.00
Wings of Circe	$19.00

Novaterm version 9.6

NEW

Join the Telecommunications Revolution... get on the Information Super Highway TODAY!

- Easy-to-use — novice user configuration
- Now supports **UUencode and UUdecode** and converts files on disk or in a buffer. Also ASCII <> PETSCII and PETSCII to Unix.
- Protocal support: **Zmodem - up/down load, resume (crash recovery), streaming to buffer**; Ymodem batch, **Ymodem-g**; Xmodem-1k, **Xmodem-1k-g**(to buffer) Xmodem-CRC; Punter; Kermit; WXmodem.
- Supports High Speed Interfaces like SwiftLink for baud rates up to 38,400 baud
- Supports ANSI color/graphics, VT102, and VT52 in 80 col. Plus C= color graphics and ANSI color in 40 col. **All emulation modules now load from one window.**

Now Just $29.95
(Specify 5.25" or 3.5" disk)

- New faster 80 column modes: **Soft-80 on C-64 (enhanced scrolling w/ REU); and 25- or 28-line C-128 VDC 80-col. mode.**
- Now **use any memory device as a buffer** including: 17xx REU, RAMLink partition, GeoRAM, C128 VDC, BBGRAM, and internal C64 memory.
- New text capture features:Capture text on-line and store in any device; High-speed transfers directly into memory and now **retain buffer contents with battery/power backed RAM devices such as RAMLink.**
- Enhanced full featured **Text editor can now load/save files from the buffer** and has an integrated script compiler.
- Script language for automatic operations
- Simple BBS mode - dial-in downloading
- Supports **real-time clocks in CMD devices**
- **All new user's manual**

JiffyDOS

Increase Speed Up to 1500% while retaining 100% compatibility

64 System Computer & Drive ROM $39.00

Add'l Drive ROMs $19.00

128 system Computer & Drive ROM $49.00

Note: Computer Serial Number Required for C-64/64C Orders

COMMODORE WORLD

THE NEWS MAGAZINE FOR C-64 & 128 USERS

For more than two years, Commodore World has been keeping the C-64/128 market alive with up-to-date information from some of the brightest minds in the Commodore community. From beginner to expert, CW has something for everyone. Columns regularly cover: Programming, what's new, reviews, games, GEOS, telecom, projects and much more! Stop listening to everyone telling you what you can't do with a Commodore and see what the latest innovations can do for you!

Subscribe for only $29.95

Canada $35.95, EC Countries $45.95, Other Foreign $57.95

Shipping and Handling Charges

	Continental United States					
Order Subtotal	UPS Ground	2nd Day	Next Day	AK HI, PR	Canada	Foreign
$0.01 to $19.99	$4.50	$13.00	CALL	$15.00	$5.00	CALL
$20.00 to $29.99	$5.50	$17.00	CALL	$17.00	$7.00	CALL
$30.00 to $59.99	$6.50	$19.00	CALL	$19.00	$9.00	CALL
$60.00 to $149.99	$7.50	$21.00	CALL	$28.00	$12.00	CALL
$150.00 to $299.99	$10.00	$25.00	CALL	$35.00	$20.00	CALL
$300.00 to $799.99	$15.00	$29.00	CALL	$40.00	$25.00	CALL
$800.00 and up	$20.00	CALL	CALL	$50.00	$38.50	CALL

UPS C.O.D. add $5.00 (US/PR only)

Policies: CMD accepts: Major Credit Cards, Money Orders, COD and Personal Checks. Personal Checks are held 3 weeks. Customer is responsible for shipping charges on refusals. Most items are stock, contact CMD for firm delivery. Returns for merchandise credit only within 30 days with prior authorization. Credits are less shipping, handling, taxes, customs, duties, and a 10% restocking charge. No refunds or credits on opened software. All prices and specifications are subject to change without notice.

••• Major Credit Cards Accepted •••

Mastercard • Visa • Discover • American Express

Creative Micro Designs, Inc.
P.O. Box 646
East Longmeadow, MA 01028
Info: (413) 525-0023
Fax: (413) 525-0147

http://www.oldgamesitalia.net/
http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Special Offer Extended

On the fastest, most advanced storage devices available for the C-64 and C-128 computer

RAMLink™

Power-Backed Expandable RAM-disk Drive

- Fastest possible method of storage with capacities up to 16 MB. Power and battery back-up retains data even when computer is turned off!
- Equipped with CMD DOS for flexibility and optimum compatibility, RAMLink can emulate multiple 1541, 1571, & 1581 disks or use CMD Native partitions.
- Ideal for use with GEOS as RAM Disk, RAM Expansion or both.
- Easily connects to cartridge/expansion port yet behaves and operates like a super-fast disk drive with built-in JiffyDOS and SWAP features.
- Built-in Pass-thru port for other cartridges, RAM-Port for REU's & GEORAM and Parallel port for fast access to CMD hard drives.

FASTEST

RL w/ 1 MB $189.00 • RL w/ 4 MB $229.00

Add Battery & RTC $25.00*

Full Featured High Density 3.5" Disk Drive

FDSeries™ Disk Drives

- The FD-2000 uses modern High Density diskettes (1.6 MB) just like Pentiums or the Power PCs. The FD-2000 is the highest capacity floppy drive available for the C-64/128 and is more compatible with existing software than the 1581!
- Equipped with CMD DOS for compatibility and speed, the FD-2000 also reads and writes 1581 disks, and can emulate multiple 1541 or 1571 disks.
- Easily connects to the serial bus just like any other drive and features JiffyDOS for greatly enhanced speed on JiffyDOS equipped computers.
- Features: SWAP 8/9 switch, Device # switches (8-15), GEOS compatibility software, FD Utilities disk and very small size (7.625"L x 4.75" W x 2.375"H).

FAST

FD-2000 Only $159.00

Real-Time Clock add $20.00

HDSeries™

Fast SCSI Hard Disk Drives for the C-64/128

FASTER

HD Series Hard Drives are available in capacities up to 2 GB, are fully partitionable, and can emulate 1541, 1571, & 1581 disks as well as provide Native partitions which can be up to 16 MB in size and utilize MS-DOS-style subdirectories. HD's connect easily to the serial bus or to RAMLink via a high-speed parallel cable. They are many times faster than any other type of physical disk drive. Includes built-in JiffyDOS, SWAP feature and Real-Time Clock. HD's offer superior compatibility with most commercial software including BBS, Productivity and GEOS. And with new pricing, HD Series drives offer the lowest cost per megabyte of any C64/128 storage device. Imagine... No more thumbing through endless piles of disks looking for the right one — use your hard drive like a huge file cabinet to organize and store hundreds or thousands of disks. Each 40 MB holds up to 240 -1541 disks. Get yours Today!

40 MB Only $249.00

170 MB	$299.00	•	500 MB	$379.00
1,000 MB	CALL	•	2000 MB	$659.00

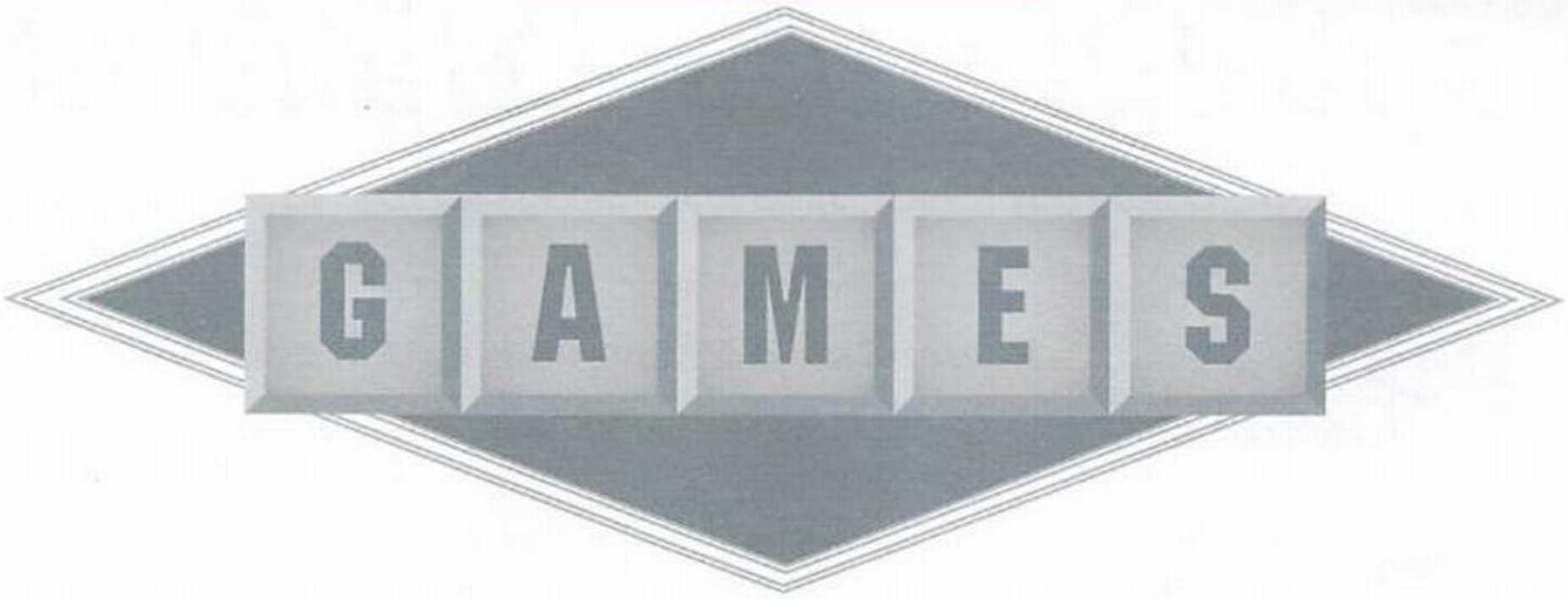
* Only valid at time of RAMLink purchase.

Offers valid only in U.S. and Canada through February 28, 1997. Prices do not include shipping and handling. Pricing and spec's subject to change without notice. See our main ad for shipping prices and policies. May not be combined with any other offers.

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/



McRat/The Zinj Complex Compilation

Crystal Software

The McRat/The Zinj Complex Compilation features two brand new games from Crystal Software. Normally, when you purchase compilations of this type you expect one game to be better than the other, but with Crystal Software's Compilation, you get two great games for your money.

McRat

McRat was designed by a former demo artisan, apparent from the very first scene. As in a demo, you must press the space bar to advance from the intro screen to the game screen. The intro screen also features a scroller in which you can read some text from the author. Additionally, the entire game is accompanied by a pleasing musical composition.

McRat is a platform style game. The object of the game is to guide McRat to the pieces of food located on each of the level's platforms. Monsters are located on each of the platforms guarding the food. McRat loses a life and returns to the bottom of the screen if he touches any of the monsters.

A timer adds to the difficulty of the game. I found it extremely difficult to advance through the levels within the allotted time frames, so I reached for my Action Replay cartridge. Using the Poke Finder feature I was able to give McRat an unlimited number of lives. Even with immortality, once I reached the higher levels, the game was still quite a challenge because the food is located in hard to reach places requiring almost impossible jumping skills. I must admit, I found this game pretty frustrating until I became immortal. If you're lucky enough to possess an Action Replay cartridge you can really become addicted to this game. This game requires a great deal of practice coupled with an abundance of patience.

The Zinj Complex

Once you've had your fun with McRat, you can turn the disk over and enjoy the thrills of The Zinj Complex. The Zinj Complex is every bit as enjoyable as McRat. At the moment, I really can't decide which game I prefer and it's a good thing I don't have to choose!

In The Zinj Complex you take on the role of the "crack-specialist of the secret American anti-madscientist team." Your mission is to infiltrate the Zinj Complex and rid it of hostile enemies while looking for large blue diamonds rumored to exist. You are equipped with a "supa-nme-stun-o-matic mark 3" and a safety cloak. Even with these two devices, time is of the essence due to the toxic gases oozing from the walls.

The layout of the game reminded me of a Nintendo game called "Smash TV". Looking at the game screen it feels as if you are looking down from the ceiling of the room. Each room contains crates and enemies. The enemies will zap away your cloak if you run into them. The crates contain lift cards, key cards, booby traps, and energy boosters. I think they are also supposed to contain diamonds, although I was unable to find any the first five or so times I played. Once you've depleted the room of enemies and searched its crates you can move onto the next room. Some doors require the use of the key cards.

I love playing Zinj. It features some really fantastic music. However, I quickly found it frustrating due to the time limitations. And, unfortunately, my Action Replay cartridge couldn't help me out. I felt there wasn't enough time allotted to complete the requirements of the game. Perhaps, I just need to brush up a little on my game playing skills.

In the McRat scroller the author states that McRat is his first attempt at creating a Commodore Game. He says he decided to attempt programming rather than sit by passively playing the games. I'd like to thank him for his efforts. McRat is a pretty good first attempt at game programming. If only we could so something about those time constraints! Maybe next time.

- Sherry Freedline

Jordan Vs. Bird One On One

When Electronic Arts hit the computer software scene in the early 1980s, one of their most highly touted products was the basketball game One On One. Back in 1983, two of the biggest names in the sport were Julius Erving (Dr. J) and Larry Bird. EA put both of them in a half-court duel and a legend was born. Some 5 years later, when EA decided to do a sequel, the face of the game had changed somewhat. Dr. J was retired, but a phenom named Michael Jordan had been turning some heads for a few years, so he was tapped to replace Dr. J in the new version.

Jordan Vs. Bird puts you at the controls of either player in a half-court battle. At your disposal are fakes, spin moves, dunks, jump shots, fadeaways, and long-range three point bombs. In the main one-on-one game, you can control

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES
GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES · GAMES

either player against a computer or human opponent. The computer comes in a variety of difficulty levels, which should keep you challenged for some time—at least, until you figure out the computer's game playing logic. In this game, as in any head-to-head game, nothing beats a live opponent.

Fans of the original One on One game will be happy to know that Instant Replays are still around, although in my opinion Jordan Vs. Bird is less generous with them than it could be. It's a thrill to see your great moves spelled out for you so you can appreciate them. A new addition to the game is a stats breakdown, to let you know how well you are shooting and make it easier to determine if you need a new strategy.

If you're new to the game and want to warm up, or are looking for competition that's not quite so confrontational, the game includes three-point shooting and slam dunk contests. In the three-point match, you have a short period of time to shoot long-range shots from five different positions on the court. While it can get tedious, it's one of the best ways to perfect a long-range shot for use in pressure game situations. The Slam Dunk competition is a bit different. You choose a dunk to attempt from a selection screen, and then try your best to replicate its style. If you're looking for flash on the court, this is the way to brush up. A team of judges rates your performance. In both games, a small group can compete.

Jordan Vs. Bird, like its predecessor, has all the trappings of real basketball, with a shot clock and fouls. The court is more realistic and colorful than the original game, and along with the players, feels larger. The players are more detailed than the first Dr. J and Bird were. Technically, the game is quite impressive and represents some good steps forward from the original.

Progress did not come without cost, however. Because there are so many moves you can employ, right down to step fakes, controlling the players can be a bit awkward at times. I find that the players feel sluggish at times, especially compared to the agile performance of Dr. J and Bird. On the other hand, the computer opponent in the original lost its challenge after extended use, so working out the differences in Jordan Vs. Bird is worth the time.

If you've never played basketball on the C-64, Jordan Vs. Bird is a good introduction to detailed half-court action. If you're a fan of the original, you'd do well to check out this game, but expect to re-learn some of your old tricks. Jordan Vs. Bird shows its age in a very visible way (Jordan still had a bit of hair at this point, reflected in the Jordan of the game), but that shouldn't dampen your enjoyment.

- Jason Compton

Karnov

In Karnov, you find yourself taking on the role of a Russian circus performer. You've left the circus in seek of an ancient treasure, but as with most ancient treasures of arcade-action games, the treasure is guarded by a host of unpleasant creatures.

As a circus performer you have a few resources at your disposal to combat your enemies. Not surprisingly, you're fit and limber enough to jump considerable distances over danger, onto platforms and the like to get around your enemies. Somewhat more surprisingly, you're able to breathe fireballs at your adversaries. And of course, what arcade game would be complete without a set of powerups at your disposal, which do anything from creating a tall ladder (handy for escaping danger as well as attaining difficult heights, or getting to a special area, or capturing more powerups) to increasing your firepower and granting you special temporary abilities.

Needless to say, you're an atypical circus performer. Your quest will take you through a number of levels of successive difficulty. Karnov's graphics are highly detailed, sacrificing some color for more crispness and detail. The action is side-scrolling (perhaps better known as "Super Mario" style). Enemies can come at you from all directions and you'll often find yourself blindsided in a nearly impossible situation, unable to shoot fireballs fast enough to take out your opponents. Karnov has a lot of variety to its gameplay, but you can work out precise patterns, as the same enemies tend to show up if you play sections of the game identically. In other words—if you know the three ostrich-riders are going to come at you as soon as you reach the right edge of the screen, be prepared to either turn, run, and fire or leap out of the way. I suspect that you will, just as I did, have to play the first level with this strategy in order to clear it. The frustrating part is that in later levels, you have more progress to lose each time you lose a life.

Karnov is a very faithful implementation of the original arcade version, right down to the map-progress screen at the start of every level. The enemies are just as nasty and just as hard to kill—the original, just like the 64 version, could very easily end your game shortly after it begins. Luckily, you're not losing quarters as I did, and you can learn the behavior of your opponents and work against them. Selecting powerups is basically as it worked in the arcade, with the exception of not having the second joystick button available to you—since you can accumulate powerups, a highlight box scrolls over them with the movement of your joystick. Of course, the movement of your joystick also moves Karnov, so some sneaky coordination is required if you want to get the exact powerup you were looking for.

Few would accuse Data East of really pushing the envelope of the 64's capabilities, but they did turn out a number of quality arcade conversions in their day. Karnov definitely stands as one of the better jobs.

-Jason Compton

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

SOFTWARE IN REVIEW

LoadStar's Compleat Crossword

The Loadstar disk magazine has been around for some time, so it only makes sense that they've accumulated enough quality material to put together large compilations. Dubbed the "Compleat" series, they represent some of the best work of the Commodore community over years.

Loadstar often comes with crossword puzzles, and this disk is a collection of all 220 or so they've offered. Running under the custom crossword software by Barbara Schulak, with a menu interface by Loadstar's Fender Tucker, The Compleat Crossword is easy to navigate. The main menu offers an information file about the compilation (as well as details of other Loadstar products you can order), a choice of music to be played while you crossword, and then the master list of puzzles. 1541 users will have to flip the disk to see all of the puzzles available, while 1581/FD users can read all 220 puzzles off of the disk at once.

The crossword puzzles come in two basic varieties, those in a 15x15 grid and those in a 13x13 grid. Many of the crosswords are of the "general interest" variety as you would find in newspapers, but a number have themes ranging from Star Trek to sports to musicals. Difficulty ranges wildly—Fender Tucker's puzzles sit atop the difficulty heap.

The crossword puzzle gaming software shows you the grid and allows you to move your cursor through each box of the crossword. At the bottom of the screen are windows for Across and Down clues. Their operation is very intuitive—for example, when you first load a crossword, your cursor is at the upper-left hand square. The clues for the first word across and first word down (those that branch from the square you are highlighting) appear in the clue windows. If you move your cursor right, along the first word across, you'll see a new down clue as you've moved to a new down word.

You are free to work on any section of the puzzle you prefer at any time. If you find you're stumped, you can ask for a single-letter hint for the box you're on. Just hit F5, and the box you're over will show the letter you've been searching for. If at any time you want to check your progress, you can ask the game to verify your solutions. If your letters are in the right place, they'll stay there. Any unfilled or incorrect boxes will be turned into checkmarks. You can also clear the puzzle, or give up and ask for the complete solution, at any time.

One of the neatest features of the software is that you can save and load your progress in any puzzle, in case you get stumped or simply have to work on something else or shut off the computer.

The program comes with a handful of SID musics which can be played (or shut off) while you work on the crosswords. You are free to add any SID musics, 11 blocks or smaller, to the pack.

Overall, I'm very impressed by the quality of the crossword puzzles. I, personally, am not an avid crossword puzzle player because despite what I consider to be a strong vocabulary, I get frustrated with the sneaky tricks played by puzzle authors. While there are certainly some sneaky tricks to be found in these (particularly the aforementioned Tucker puzzles), I have to admit that having clues close at hand is a great help and encouragement to stick with the puzzle. I'm also very pleased that you can "mark" puzzles as you complete them, so you don't waste your time trying to find a new puzzle only to discover you've solved the puzzle in question already. Given that there are 75 crosswords distinguished only by the name "Crossword # X", you'll appreciate it as well.

It's worth noting that the software is highly compatible with expanded hardware. In addition to being available in both 5 1/4" and 3 1/2" disk formats, the Compleat Crossword is compatible with the SuperCPU, would be quite simple to install and run from a hard drive, and is even fully functional on a Commodore 65 in C-64 mode. (You can even use the C-65's fully directional arrow pad).

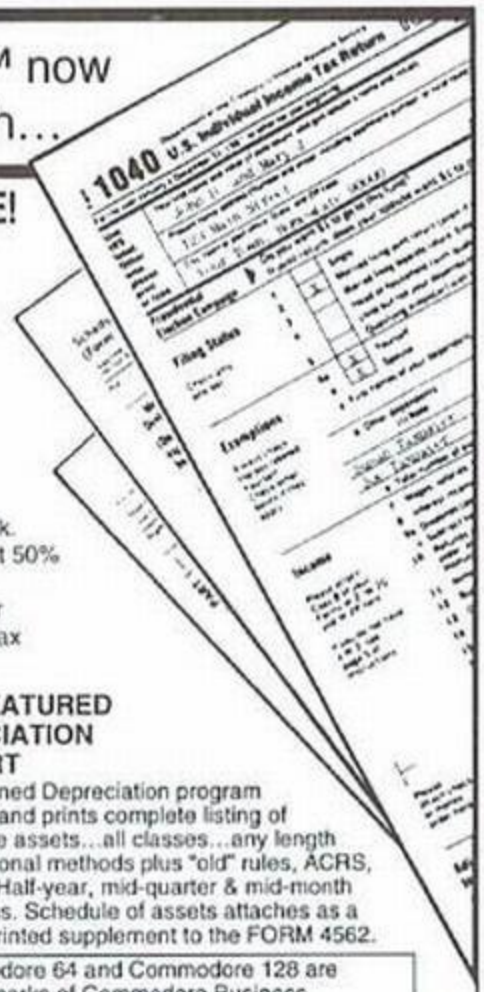
If you're not a sworn enemy of crossword puzzles, you'd do well to investigate the Compleat Crossword. Barb Schulak and company have put a great deal of effort into developing a great software interface and a terrific set of puzzles.

-Jason Compton

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

PERFECT TAX™ Get PERFECT TAX™ now and relax on April 15th...



• FOURTEENTH SUCCESSFUL YEAR! • MANY THOUSANDS ALREADY IN USE!

• Your Simple Answer to all Tax Acts changes through 1996

• PERFECT TAX is the quick, correct, easy way to do your taxes • Absolutely up-to-date with the Tax Reform Act of 1986 through 1996 and ***all new*** tax changes • Simplest tax return preparation program available - at any price • Single-keystroke form-to-form change • Automatically calculates and transfers data from every FORM and Schedule to the FORM 1040 • Simply answer the questions - PERFECT TAX calculates return, tax due or amount of refund due you • Automatically elects the greater of Standard or Itemized deductions • Prints data to all FORMS or Schedules you need for your complete return - ready to sign and file • Highly acclaimed by tax pros, CPA's and tax preparers, PERFECT TAX is easy to understand and a pleasure to work with. Available for **Commodore 64, Commodore 128** and **IBM** and **IBM Compatible PCs.**

- PERFECT TAX is fully screen-prompted, menu-driven and easy to use. System includes comprehensive User's manual with helpful tutorial example and forms library.
- With a single keystroke, PERFECT TAX instantly recalculates your entire return when you change any item.
- PERFECT TAX also prints directly onto IRS forms.
- PERFECT TAX data files can be stored on disk.
- PERFECT TAX yearly updates are available at 50% discount to registered PERFECT TAX users.
- PERFECT TAX is an essential addition to your personal software library - and best of all, it's tax deductible.

TAX PLANNING

• Most powerful program features available - at any price • Supports RAMdisk • Prints the input sheets to organize your data • Built-in calculator feature accumulates input and enters total • 32 F-Key functions achieved with 1 or 2 keystrokes. • Fast, complete tax calculations - 30 forms in under 2 seconds (most returns in under 1 second) • On-line pop-up Help menus • Full calculation-override capability • Follows IRS text & line numbers **exactly** • Exclusive context-sensitive Datachek™ pinpoints omissions - and alerts you to effects of your input • Our exclusive Current Values Display constantly reflects all changes with your input • In Planning Mode all unnecessary text input prompts are eliminated. Only numeric input is prompted for. ***New for 1996:*** 1040A and Schedule 1, 2, 3 & EIC-A, plus Schedule H.

RETURN PREPARATION

PERFECT TAX PRINTS THE INCOME TAX RETURN FOR YOU: **PERFECT TAX 64** - prints pgs. 1 & 2 of the FORM 1040 and Schedules A, B, C, D, E, H and SE as well as FORM 2441, 3903, 6251, 8615 and 8815 on IRS forms or on blank computer paper for use with transparent overlays . . 17 in all!
PERFECT TAX 128 - supports all of the above forms ***plus*** Schedules EIC, F and R & FORMS 2106, 2119, 2210, 3800, 4136, 4255, 4562, 4684, 4952 and 8396. . . 31 in all! All other forms and schedules are considered in the calculation. PERFECT TAX features direct screen input using fast ten-key style on the Commodore 128.

FULL-FEATURED DEPRECIATION SUPPORT

Self-contained Depreciation program calculates and prints complete listing of depreciable assets...all classes...any length life...traditional methods plus "old" rules, ACRS, MACRS...Half-year, mid-quarter & mid-month conventions. Schedule of assets attaches as a detailed, printed supplement to the FORM 4562.

Commodore 64 and Commodore 128 are Trade-marks of Commodore Business Machines Corp. IBM is a Trademark of International Business Machines Corporation.

Complete 1996 Edition: PERFECT TAX 64 **$69** PERFECT TAX 128 & IBM **$79**

TO ORDER Call Toll Free **1-800-525-5611** 24 Hours from anywhere outside Dallas. In Dallas Call **972/386-6320**.
VISA, MasterCard, Checks, Money Orders & COD Orders Accepted (Add 3% surcharge for credit card processing) (Texas residents add 8¼% sales tax) (Add $7.00 COD) ($7.00 Shipping)
Financial Services Marketing Corporation • 625 North Dallas Bank Tower • 12900 Preston Road • Dallas, Texas 75230

UPGRADE YOUR COMMODORE!!!

Refurbished Hardware

Monitors		Drives		Other	
1701	$149.95	1541/C	$89.95	C64 -	$94.95
1702	$149.95	41 w/Dips	$104.95	64C -	$114.95
1802	$174.95	1541-II	$119.95	128 -	$174.95
1802D	$199.95	1571	$159.95	128D	$324.95
1902	$224.95	1581	$174.95	SX-64	$349.95
1902A	$249.95	MSD-2	$149.95	1660	$24.95
1084	$294.95	1001SFD	$129.95	1670	$39.95
1084S	$324.95	B.I. Buscard-II			$59.95
Mono's	$44.95+	1530 Datasette			$34.95

Miscellaneous

Books	$10-$15	Printer Interfaces $49.95+
Prog's	$5-$20	Epyx Fastload Cartridge $34.95
Repairs	$ASK	Super Snapshot v4 $49.95
Manuals	$7	Super Grafix Jr. $39.95

New Hardware

New APROTEK Accessories

C24-2400 Baud (64/128)	$74.95
User Switch	$30.95
Convert-A-Com	$29.95

New CMD/LMS Accessories

JiffyDOS C64/SX64 'System'	$69.95
JiffyDOS 128/128D 'System'	$79.95
128 Kernal $59.95 64 Kernal	$49.95
Additional JiffyDOS Drive ROM	$34.95
RAMLink Bs. $209.95 c/w 0 MB	$274.95
c/w 1 MB $319.95 c/w 4MB	$479.95
Real Time Clock (Optional) Add	$24.95
FD-2000	$249.95
NEW Super Snapshot v5.22	$84.95
1750 Superclone REU 512K	$169.95

Ask For Anything! We May Have It!

J.P. PBM Products By Mail
Box# 60515, N. Sheridan Mall P.O.
Downsview, Ont. Canada M3L 1B0
Tax-Canada + 7%GST, Ontario +8% PST

Send CDN Funds/15% USA Exchange
15 day Warranty On Refurbished Hdwr.
Allow 4-6 weeks for delivery
1996 Catalogue Disk (64 Format) — $2

Shipping-($0-$25=$4, $26-$99=10%, $100-$199=8%, $200-$499=7.5%, %500=-6%, USA=15%)

FREE CATALOG

With Tons of Commodore Stuff!

Write to: FREE CATALOG
Parsec, Inc.
P.O. Box 111- CW
Salem, MA 01970-0111
USA

CW & RUN BACK ISSUES

For years, *RUN* Magazine provided Commodore Users with a great source of information, and now CMD has given you *Commodore World*. Don't let this valuable information slip away—fill in the voids in your library now!

RUN Magazine Back Issues

Any 3 issues for $12.00, any 6 for $18.00, or any 12 for only $24.00

RMJAN89	January 1989	RMJUN90	June/July 1990
RMFEB89	February 1989	RMDEC90	December 1990
RMMAY89	May 1989	RMJAN91	Jan/Feb 1991
RMJUN89	June 1989	RMJUN91	JuneJuly 1991
RMJUL89	July 1989	RMJAN92	Jan/Feb 1992
RMAUG89	August 1989	RMMAR92	March/April 1992
RMSEP89	September 1989	RMMAY92	May/June 1992
RMOCT89	October 1989	RMJUL92	July/August 1992
RMSP89	Special Issue 1989	RMSEP92	Sep/October 1992
RMJAN90	January 1990	RMNOV92	Nov/December 1992
RMMAY90	May 1990		

Shipping: 3-6 issues - U.S. $3.00, Canada $5.00, Foreign $15.00; 12 issues U.S. $5.00; Canada $7.00; Foreign $20.00.

Commodore World Back Issues

$4.95 each, or any 3 for only $12.00

CW1	Commodore World Issue 1	CW9	Commodore World Issue 9
CW2	Commodore World Issue 2	CW10	Commodore World Issue 10
CW3	Commodore World Issue 3	CW11	Commodore World Issue 11
CW4	Commodore World Issue 4	CW12	Commodore World Issue 12
CW5	Commodore World Issue 5	CW13	Commodore World Issue 13
CW6	Commodore World Issue 6	CW14	Commodore World Issue 14
CW7	Commodore World Issue 7	CW15	Commodore World Issue 15

Shipping: U.S. and Canada $2.00 for first issue, plus $1.00 per additional issues.; Foreign $5.00 per issue.

TO ORDER CALL 1-800-638-3263

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Graphic Interpretation

by Paul Sullivan

DUAL TOP 2.6

I would like to begin this article by confidently stating that the Commodore's Graphic Environment Operating System, a.k.a. GEOS, will carry C-64 and C-128 users well into the next millennia. This sounds obvious, I know, but it is true, and the criticisms I hear to this kind of assertion I find very amusing indeed. For example, when some IBM user digs the elbow in and says, "a C-64 as in AD?" or "GEOS, yeah, archaeology is fun" then let me assure you, remind them that IBM can mean incredibly big money. IBM and Macintosh are indeed the main players in the computer scene; however CMD and other companies are keeping the 64 not only alive and well, but expanding in its capabilities while maintaining very affordable prices (Windows 95 UPGRADE alone is over $100—GEOS, $35). My best friend Bill and my niece Adrianna are new C-128 and C-64 owners respectively, (with a little help from old buddy/Uncle Paul) love their systems and are already looking to expand because of GEOS' capabilities. Read on for this edition of Graphic Interpretation you'll learn about a file management tool that will make using GEOS even more convenient.

GEOS has many functions and features that are strikingly similar to the latest high-tech operating systems such as the very popular Windows 95 by Microsoft. I can state this confidently because my workplace gave me the opportunity to take classes for Windows 95. To my amazement I realized that I could have practically taught half of that Introduction to Windows class; knowing GEOS made it a snap. A great comparison can be made of the deskTops that each system has: both have application and file icons, a trash can/recycle bin, command

menus and changeable backgrounds, to name a few. This only carries so far, however, as the GEOS desktop lacks the multitasking and speed capabilities of its 32 bit counterpart. As a result, over the years many geoProgrammers put on their thinking caps and produced such gems as Switcher 1.3 (discussed in World #15). CMD also responded to the need with the amazing "gateWay" which enables the user to resize windows and even task-switch. I would like, in this issue, to take the opportunity to introduce you to another programming masterpiece entitled "Dual Top 2.6."

This amazing shareware gem can supplement your use of both the deskTop and gateWay. As the name implies, it is a deskTop alternative. Dual Top can be activated manually by double-clicking its icon, or placing it right after Configure for it to auto-execute. It is smaller in size than the deskTop (27K compared to deskTopís 35K) and it derives its name from its most prominent feature, the ability to simultaneously display two disk directories in side-by-side vertical columns. In striking contrast to the deskTop is maximum display capacity of merely eight icons per page plus any border files on one disk, the Dual Top lists the first 15 files on either or both of the two disk directory columns. In these unforeseen days of multi-megabyte RAMdrives and high-density disk drives for Commodore user, you are bound to have far more than 15 files on a disk. No problem! Just point-click the appropriate arrow, and you'll be smoothly scrolling down the file listing, no deskTop pages to turn, and no waiting for icons to redraw. It must be pointed out, however, that the Dual Top was designed to work with GEOS 2.0 and a RAM expansion unit. Earlier versions of GEOS and/or an unexpanded system will not support Dual Top. In the software documentation for Dual Top, Mr. Murdaugh describes the deskTopís limitations in drive support. The kernel design is such that, although it can support four drives, disk or RAM, it views them as two pairs of drives, A,B and C,D. A barrier exists between the two that Mr. Murdaugh likens to "two sides of a river with no bridge between them." Berkeley Softworks/ GeoWorks, applications (including the deskTop) complicate the matter further by operating only within A,B, the first set. Drive C can be accessed, but only by swapping with Drive A or B. Here is where Dual Top builds the bridge." The kernel can access the A,B and C,D drive sets in the same manner, thus eliminating the need for swapping drives to access a third drive. Although the file icons are not visible, each of the filenames are just as accessible as the icons on the deskTop. Point-click over a filename and it will highlight. Double-click the

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

filename and it will open or activate. Also, the command menu bar is at the top of the screen, as with the deskTop. These command options have several noteworthy functions among them.

Is drive-swapping, i.e. changing device numbers an issue for you? It isn't under Dual Top, "configure" is the third option on the menu bar, and the position of drive A, B or C can be switched in an instant, without needing to enter the actual Configure application! This easy access to all three drives clears the way for the file management features. Between the two drive directory windows are ten buttons, the top three indicating which drives are A, B, and C. The next seven perform various functions on selected files in the open "Source" window. "All" selects every file in the Source window while "Clear" will deselect every file. "Info" will open the familiar window seen in deskTop that gives relevant data and the icon for any file, and "Print," "Rename" and "Delete" are obvious, so I will move on. I have saved the best for last: "copy."

Copying a file, multiple files or an entire disk has never been easier. In the Dual Top the tedious chore of flipping through pages is replaced by smooth scrolling through the directory, and you may copy between any combination of drives (swap-free!). Open a disk by clicking its button, (left or right window, it doesn't matter) and the directory appears in the "Source" window. Note that when you click the opposite window, it will become "Source," and the first window you opened will now read "Destination." Do not let this confuse you, just click on the drive that you want to copy to, and then click again anywhere over the original "Source" window. Your target disk window now should read "Destination." Choose your files, click "copy," and away you go!

The last two features on the menu bar are "Auto Dir(ectory)" and "Auto Sort." The first of these will open up the directory of a selected drive every time you enter Dual Top. I have mine pre-set to drive B, which is my RAMdrive. "Auto Sort" will put a pre-selected drives directory into alphabetical order. This is very handy for long directories, and I must also point out that it sorts the names as they appear on Dual Top, but does not change their actual location on the disk. So, yes, you can autosort boot disks without worrying about disrupting their booting capability.

Other features that make the Dual Top particularly convenient to use include its keyboard shortcuts, gadgets, gauges, and accessibility. Disks with dozens of files can be reviewed in a flash using the function keys. F1 goes to the "Source" listing's top, F7 to the bottom. F3 moves one page up, and F5 one page down. Does this seem unimpressive? Remember, there are no icons being drawn and redrawn, and 15 files instead of 8 to a page. Yes, we're talking Speedy, "I guarantee it." Back to the copying function for a moment, you are copying a disk, on only file 4 of 37 big ones. Need to stop? Press C=, and breathe easily.

There is also the helpful little features of the "gas" or Kbytes-remaining gauge on the outside of the windows. The inside gauge shows the amount of files with an adjustable gadget displaying your location within the directory.

Finally, there is the accessibility issue. Let's say that you just need to get back to the gateWay or the deskTop to duplicate a file (can't do that on Dual Top). Just click on the GEOS menu and select either option. What more can be said? Look into your local user group for Dual Top! It will make your GEOS experience even more rewarding.

COMMODORE COUNTRY

Everything for Commodore Computers
Sell • Trade • Repair • Buy
1420 County Rd. 914
Burleson, TX 76028
817-295-7658
817-447-6974 - Voice/FAX line

ALL STORE ITEMS HAVE A 90 DAY WARRANTY. IF, FOR SOME REASON YOU ARE DISSATISFIED IN YOUR PRODUCT, YOU MAY RETURN IT FOR REPLACEMENT OR STORE CREDIT ONLY. SORRY, NO REFUNDS.

C64/1541 Repair - $40
SPECIAL
C64, 1541, J-S+Sft. - $99

We carry a full line of hardware, software & magazines, both new & used, including European items. Our flat-rate repairs include both parts & labor. Call for details. Trade in your unwanted items.
Catalog - $2.95
ALL MAJOR CREDIT CARDS ACCEPTED.
We carry a full line of Amiga Products.

CPU

P.O. BOX 1817
SHELTON, WA.
98584

The Commodore 128/64 Power User Newsletter

CPU is a quarterly publication that for two years now has kept its readers abreast of new developements and helped those to get more out of their investments.

Sample/Back Issues: $3.50
6 Issue Subscription: $15.00 us
International: $27.00 us
Canada and Mexico: $21.00 us

Ushering the Commodore user into the 21st Century.

TECH STAR COMPUTER CENTER
(206) 251-9040

We'll repair your Commodore.
Serving the Commodore community since 1984.

REFURBISHED SPECIALS

SYSTEMS

C64.....$69.00	1541.....$69.00	C64 & 1541.....$120.00
64C.....$79.00	1541 II...$79.00	64C & 1541 II....$140.00
C128.....$89.00	1571.....$89.00	C128 & 1571.....$150.00
VIC20.....$59.00	SX64.....SCALL	128D.....SCALL

PRINTERS

1525.....$49.00	MPS 801.....$59.00
1526.....$69.00	MPS802.....$69.00
SG10.....$89.00	Star 10X.....$79.00
Star 15X.....$99.00	SG10C.....$89.00
MPS 803.....$69.00	DPS 1101.....$99.00
DPS 1101....$99.00	OKI 10.....$69.00
OKI 20.....$79.00	

MONITORS

1701.....$119.00	
1702.....$119.00	
1802.....$119.00	
1080.....$159.00	
1084.....$159.00	
1084S.....$159.00	
CMONO...$ 29.00	
MONO.....$ 59.00	

MISC.
Power supplies, cables, ribbons, paper, disks, cartridges, programs new and used, books, magazines, accessories.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Carrier Detect

By Gaelyne R. Gasson

THE SEARCH IS ON: FINDING STUFF ON THE INTERNET

I've often heard the comment: "Oh sure, everything you want to know is on the Internet, you just have to know where to find it." It is the same idea when your visiting a friend or relative and trying to make a cup of coffee. You know everything you need is in the kitchen, but that doesn't mean you'll find the things you need any faster. Learning how to find information on the Internet is an important skill, and with a few pointers, you can use the Internet more efficiently.

Where The Goods Are Stored

Becoming familiar with the Internet's organization is similar to opening all the cupboards in a kitchen. One advantage to the Internet is that even if an item is stored in one place, it's usually accessible by other means. Here's a quick list of Internet places where your search can lead you.

FTP

Binary files and informational text are stored on FTP sites. You will need to know what site carries the information you want, and where to find the file(s). Using FTP directly is often the most efficient means of locating an item.

Gopher

Many colleges and universities have Gopher sites for informational material. The menus are easy to use and navigate, and you can bookmark a document or menu to return to it later. On the downside, Gopher servers can be slow and many places have more current information on the World Wide Web.

Usenet Newsgroups

Usenet newsgroups are divided into several hierarchies which cover: computers, science, humanities, social, news, recreation, miscellaneous, and talk. Using this hierarchy, you can generally find something relating to your chosen topic in one or more of the groups. By reading previous posts, you can often glean current information without the need to post any questions.

Usenet FAQ Files

Usenet Newsgroups have FAQ (Frequently Asked Questions) files, which are usually jam-packed with information. In turn, they can point you to other material on the same topic. Keep in mind that the material is probably biased towards the Newsgroup subject, which can be a blessing or a curse, depending on your point of view.

World Wide Web

The World Wide Web was developed to allow Internet users access to most utilities from one "interface." Although often used for entertainment, an advantage is it gives you access to the Internet as a whole.

Finding Gold

The World Wide Web has several utilities which aid in locating material. Three such utilities are AltaVista (http://altavista.digital.com), WebCrawler (http://webcrawler.com/WebCrawler/WebQuery.html), and the Lycos Internet Directory (http://www.lycos.com/index.html). These search engines use an automated process to collect and sort World Wide Web pages daily, and then uses a database to store the information. Deja News (tm) (http://www.dejanews.com) collects articles from Usenet newsgroups daily and allows you to search for keywords. Deja News keeps both a current and "old" searchable database.

Many are familiar with Yahoo! (http://www.yahoo.com), but for searching the entire Web Internet Yahoo! falls short as it uses its own indexing from those who have submitted Web sites. According to the Yahoo! FAQ (Frequently Asked Questions) page, Yahoo! does an automatic search and looks for "new announcements at various places." However, it doesn't state *where* its automatic search looks for these announcements. A search for "C-64" with Yahoo! yielded just 12 World Wide Web links. The same search gave the following match results: AltaVista-

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

9,000, Webcrawler-323 and Lycos-2,187. Since the Yahoo! index is categorized, it's easy to look up a specific item. However, the information in the index isn't as current because it sometimes takes weeks for a submitted URL to be added.

World Wide Web Search Engine

Most of the time, I use the AltaVista search engine to find items by searching for a single word. WebCrawler uses the same commands as AltaVista, as does Lycos, but Lycos has a couple of different notations from the other two (see the sidebar for the differences).

On the search form provided by the search engine, I type in a word for the subject I'm interested in, and then select "Submit" or "Search." In a short time, a WWW page is displayed, showing a list of Web pages with the word I want to find. Depending on the search utility, this may include a few lines of text from each web page to help you decide if the page has the information you are looking for. Near the bottom of the page, you'll find links to the next search pages, plus links to any previous or next pages within the current search page. I look at a Web page in the list, and if it doesn't meet my liking, I can return to the search list and try another. (It's the shift and cursor left/right keys to return to a previous page while using Lynx.)

After glancing at the titles of about 30 links, if I haven't found what I want, it's time to take a new approach. I need to choose a new keyword, or limit the search by using more specific choices. After all, no matter what you're looking for, it's always found by a process of elimination. Even when trying to find a coffee mug in an unfamiliar kitchen, we do so by ruling out areas such as drawers, or lower cupboards.

Limiting The Search

Knowing the "rules" when searching for more than one word can really speed up your search time. The following the rules for a simple search.

If you use capital letters, it looks for matches to the *exact* word, but if you type lower case letters, it finds any match (capitals included). For example, if you search for "commodore" and the search engine will find both "commodore" and "Commodore." A search for "Commodore" will find only pages with the word "Commodore."

Listing several words on the search line will result in the engine finding documents with as many keywords and phrases as possible. The list is presented with documents having the most matches first. This isn't always the best approach, as we will see with other choices below.

WWW Search Engine Features

While search engines often share the same function, the way information is presented often differs. Here's a brief look at what AltaVista, WebCrawler, Lycos and DejaNews™ offer users:

Searches

	Text-Only	Add URL	Categories	WWW	Usenet	Results	#Matches/Page
AltaVista	Y	N	N	Y	Y	S,C,D	10
WebCrawler	N	Y	Y	Y	N	S,C	10/25/100
Lycros	N	Y	Y	Y	N	S,C,D	10/20/30/40
Deja News™	N	N	N	N	Y	N/A	20

Results Legend

```
S = Standard Format (Title and first few lines)
C = Compact Format (Title only)
D = Detailed (Shows similar links if any)
```

AltaVista

Special constraints can be used in search query to match specific WWW page and Usenet attributes in searches, such as image, anchor, link, URL, text, and title for Web pages and newsgroup, subject, from, summary, and keywords. Usenet archives are only kept for a few weeks.

WebCrawler

Offers "WebRoulette" (random links), "Surf Backwards" from a given URL (to pages that link to the URL), and WebFacts (current "guess-timate" on size of the World Wide Web and number of servers linked to it).

Lycos

Search options include Sites by Subject, Sounds and Pictures as well as the Web in general.

Deja News™

Offers ability to subscribe to a newsgroup to read and post articles while online just as a user would from a standard Usenet Newsreader. Searches for keywords from its current or archive (beginning March 1995) database. Shows an "Author profile" with list of other articles posted by the same person. Has advanced search features in an easy to use "forms" format. WWW URL's in newsgroup articles can be selected for further Web browsing.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

WWW Search Engines

AltaVista
`http://altavista.com`

AltaVista Australian Mirror
`http://www.altavista.yellowpages.com.au`

WebCrawler
`http://webcrawler.com/WebCrawler/WebQuery.html`

Lycos
`http://www.lycos.com/index.html`

Lycos Note: Use a "." after a word for an exact (case sensitive) match. Instead of a "*" wildcard, use a "$".

Searchable Indices

Yahoo!
`http://www.yahoo.com`

CaBooM!
`http://www.jbrain.com/caboom/`

Usenet Search Engine

Deja News
`http://www.dejanews.com`
Detailed searches of only the Usenet Newsgroups

To search for a phrase, use quotation marks. A search for "money" (no quotes) results in two million matching Web pages. Yet the phrase "money is the root" (quotes included) returned about 100 WWW pages.

Using the plus and minus symbols (+ and -) before a word finds pages with required matches, or causes a word or phrase to be ignored. This eliminates bringing up associated topics you may not want. For example: +"Gaelyne Gasson" -"Gaelyne Moranec" will return a list with only those Web pages that use my new surname.

You can use more than one plus and minus symbol in your search, or use it with single words and phrases. This is useful when a word can have more than one meaning or use. For instance, a search for baggage will result in 32,000 matches that include topics like retail sales, airline baggage, baggage carts, baggage tags, etc. If we only want airline baggage, we can use +airline +baggage. This resulted in 20,000 WWW pages found, but included the pages that dealt with other issues. To rule out all pages dealing with other airline and baggage topics, we can try: +"airline baggage" -terrorism. This returned a manageable 139 matches of WWW pages dealing specifically with airline baggage but keeps terrorism topics out of the list.

If you're not sure about the correct spelling of a word, you can use the "*" wildcard. The wildcard can be used after the first three characters of a word. If too many matches are found, the word is ignored and no matches are displayed. To find matches for both colour and color, try searching for "colo*r."

Search Tools

Whenever I visit a library to find specific information for a research project, I take along pen and paper. This may be "old fashioned," but a note to remind me what I was looking for in the first place saves me time I'd waste otherwise. This is also useful when searching the Internet. I don't trust my memory, so I jot down file names or World Wide Web URLs.

Bookmarks

The Bookmark file is a great tool to use so you can quickly return to a place with information you're interested in. In Lynx when you want to save a WWW link for future use, press the "a" key and answer the prompts. My bookmark file used to be a jumble of unsorted places that didn't help me find anything very easily. I edited this file (you can edit it online or offline) and put similar items together making it easier to use. I had a very keen interest in migrating to Australia and had bookmarked several WWW places with this topic. When I organized my bookmark file, I put the links for these items together in one place. Later, when I wanted to use the information, I could easily find the link to the Australian Embassy in my bookmark file. If I need to type a specific URL, I often import the bookmark file to avoid typing the information directly.

Make Lynx Do The Work

When accessing the World Wide Web with Lynx, the "/" and "n" keys will help you find keywords in a web page. The "/" key prompts you to "Enter a whereis query:", but what it is really asking is "Enter word to look for." If the word you type is on the page, Lynx adjusts the text so the word appears on the first line of the display. The "n" key will take you to the next occurrence of the word. This lets you move directly to the information or link you want. The biggest disadvantage to search engine pages is having a zillion links on a page. If I use the "/" feature and type the word for a link I want, it saves time and effort. When I use a search engine with several pages, usually it will have a link for "next." If I've defined the word "next" within lynx, I can hit "n" to zoom to the link for the next search page. This technique saves many online minutes.

If Lynx is configured as "Numbers act as arrows," you can navigate a Web page using the number 1 and 7 keys. Pressing the number "1" will move you to the end of a Web page, and "7" moves you to the top. When using any text entry form, you can jump to the start or end of the line by using CTRL-a or CTRL-e, respectively. If you want to erase the line, press CTRL-u.

Wrap Up

I've used Web search engines for serious research, and they've provided me with access to the information I needed without a lot of wading through junk to get there. Using the techniques outlined you can surf in the fast search lane too.

AltaVista, WebCrawler, or Lycos Search Strings

`+c64 -128`
Links with references to the C64 only. C128 can try: `+c128 -c64`

`/pub/cbm*`
Get a list of several WWW sites that have links to Commodore FTP sites.

`/pub/cbm* -emul*`
The same list, but without links to Commodore emulator pages.

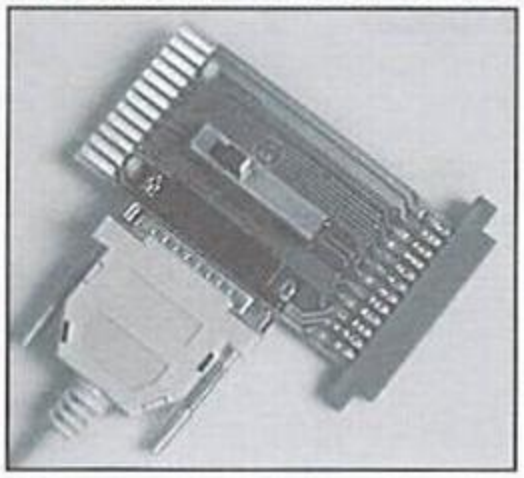
`ccnga.uwaterloo.ca/pub/cbm*`
Links of Commodore related ccnga.uwaterloo.ca links.

`newsgroup:comp.sys.cbm +faq`
A list comp.sys.cbm newsgroup articles that include the word "faq."

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

GEOCABLE II
Parallel Print Cable



The Most Advanced Parallel Print Cable Ever!

- **Uses Standard Cable** Equipped with a female DB-25 cable connector to allow use of standard 'PC' printer cables.
- **Switchable Pass-thru** Allows connection of printer and other user port peripherals such as modems without conflicts.
- **Faster Output** Parallel printing offers up to a 40% increase in output speed.
- **GEOS Drivers Included** Includes GEOS drivers plus useful GEOS utilities like MacAttack II, WrongIsWrite, and GEOS CONVERT.

GEOCABLE-II (6 ft.) ONLY $29.00
GEOCABLE-II (15 ft.) ONLY $34.00
Shipping: US $5.00, Canada $7.00, Foreign $25.00.

GeoCable II is compatible with GEOS, Perfect Print LQ, Action-Replay MK VI, Superbase, Superscript, Paperclip III, and all software that supports user port parallel printing.

Creative Micro Designs, Inc.
P.O. Box 646
East Longmeadow, MA 01028
Orders: 800-638-3263
Info: 413-525-0023

EXPAND YOUR SYSTEM

3 SLOT CARTRIDGE PORT EXPANDERS

The EX2+1 and EX3 Cartridge Port Expanders bring new expandability to you Commodore 64 or 128. Combine the use of compatible cartridges. Disable cartridges not in use. Change the address your computer finds a cartridge at. Avoid the constant changing of cartridges that puts extra wear on your cartridge port. The EX3 offers 3 vertical expansion slots, while the EX2+1 provides 2 vertical slots and 1 horizontal slot. Both units offer 7 switchable signals per slot, address mapping on slot 2, and a reset button.

CALL 1-800-638-3263

EX3

$29.95 Plus S/H

EX2+1

$34.95 Plus S/H

Creative Micro Designs, Inc., P.O. Box 646, East Longmeadow MA 01028

Used & Refurbished

PRINTERS • MONITORS • DISK DRIVES

CALL 1-800-638-3263

Creative Micro Designs presently has a huge overstock of used and refurbished printers available at prices from $30 to $100. Other items, such as blemished monitors and third-party disk drives are also available at reduced prices. These super deals won't last long, so be sure to contact CMD right away about your printer needs!

PRINTERS
Commodore 1525 • Commodore 1526 • Commodore MPS 801
Commodore MPS 803 • Protecto Big Blue • Seikosha SP1200VC
Star NX-1000 • Star NX-1000C • Panasonic KX-P1080i • Okimate 20

MONITORS
Commodore 1802 • Sanyo 40 Column Color • Magnavox CM8502

DISK DRIVES
Amtech RF512 C • Enhancer 2000 • Excellerator Plus • Blue Chip

MISCELLANEOUS
Commodore C-16 • Epxy Fastload • Super Graphix Jr

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

GEO PROGRAMMIST

By Maurice Randall

Have you ever written a program that trashes disks? I have, but not intentionally. Fortunately, I've been lucky enough to catch the problems before releasing the programs. Let's see if I can show you how to avoid a very bad situation.

The Current Drive

With the exception of GEOS, it is easy to find out which drive is active by checking the location at 186 (hex $ba). More programmers should adopt this practice because the days of having a single 1541 at device 8 are over. Users like to make use of all the devices they have.

With GEOS, however, it's a little different. You should make sure you make use of any device that is online or your program will get little use. Don't limit yourself to drive A and B either, as the original Desktop does. The person using your program might be using A, B, C, and even, D—making it necessary to accomodate the extra drives.

How do we know which device is active? We don't always need to know, but you don't do it by checking location $ba, which in GEOS is known as curDevice. This method gives only the current serial bus device as far as the normal CBM kernal routines are concerned. GEOS knows which drive is current through the variable known as curDrive. This is the location you should be concerned with. Remember that GEOS does not use the Commodore serial bus routines for accessing the drives, especially when a RAMDisk is being accessed. The only time the Commodore routines are used is when sending the turbo code residing within the drive to the drive. The custom turbo routines can't be run until that code is in the drive. The Commodore routines are also used when accessing a printer on the serial bus. (Note to users: This is a good reason to have JiffyDos even if you only use GEOS. The turbo code is transferred faster. This takes place many times while GEOS is running, not just during the bootup period.)

Outside of GEOS, if you use the Listen routine to access a drive, the kernal will set up curDevice for you. In GEOS, you would only use Listen if you need to do something out of the ordinary with one of the drives. For most applications, it is not necessary to access the internal workings of a drive. That is left up to the disk drivers themselves as well as applications such as Configure and the Desktop. Prior to using Listen, you may or may not have to remove the turbo code from the drive. It all depends on what you intend to do. In either case, you need to turn the code off before any of the Commodore kernal routines such as Listen can access the drive.

Exit Or Purge?

If your drive access is going to affect the RAM inside the drive where the turbo code resides, you will need to purge the code from the drive first by using the routine PurgeTurbo. Just call the routine and then you are ready to do a direct access of the drive. If you are only going to perform a task such as reading the drive's error channel, then you only need to call ExitTurbo. The code will still be in the drive, but will be turned off. EnterTurbo will turn the code back on. EnterTurbo also serves the purpose of reloading the code into the drive if you had called PurgeTurbo. Reading the drive's error channel or sending certain commands to the drive's command channel do not affect any code that is in the drive's RAM, unless the command actually writes to the RAM, as with a memory write command. It is very unlikely that you will ever need to do any direct access of the drive such as this—GEOS is designed to do this dirty work for you. GEOS has some better routines for your application to use. After all, what's the point in rewriting something that already works fine.

The SetDevice Dilemma

Are you ready to get into trouble? A quick way to find yourself knee deep is to store a value to curDrive. Let's say your application is currently running with drive A as the active drive. A quick check of curDrive would show a value of 8 there. You would think that you could store a 9 there and then access drive B—not so. There are other things that need to be done in order to make this work. Let GEOS do this for you with the routine SetDevice. SetDevice performs several tasks, with the end result being that the intended drive will be ready to be used by your application. You will then be able to load or save data to the drive. SetDevice will turn off the turbo code in the current drive and then perform the necessary task of bringing the correct disk driver from the REU into memory. It does not, however, turn on the turbo code in the new drive. We will get to that later. You would think that SetDevice would report an error should anything go wrong, right? Wrong. It was meant to, but the original designers of GEOS goofed. You're on your own in detecting errors. Using SetDevice is simple:

```
lda #9
jsr SetDevice
```

This will prepare drive B for you. According to the GEOS Programmer's Reference Guide, the x register will indicate any disk error that may have

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

occurred. The problem is x will always return holding a zero value which would indicate no errors.(Note: In GEOS 3.0, SetDevice has been rewritten to return an error in x if the desired drive is not available.) What if drive B does not exist? Seems to me like the above routine showing no errors would indicate that drive b indeed is online and can be accessed. After all, we called SetDevice to prepare that drive for access.

So how do we know that drive B really does exist? First let's look at what might happen if it's not there. For a simple scenario, let's say that your application merely copies the boot block from one disk to another, but prior to saving the block to the second drive, you might change something. This is a very logical and useful idea. The following code might accomplish this task:

```
lda #8
jsr SetDevice
LoadW r4,#diskBlkBuf
LoadB r1L,#1
LoadB r1H,#0
jsr GetBlock
```

make changes within diskBlkBuf here...

```
lda #9
jsr SetDevice
jsr PutBlock
```

That seems pretty straightforward. We loaded track 1, sector 0 from drive A into memory at diskBlkBuf. We made whatever changes we wanted and then opened up drive B and wrote the block to the drive at the same location. Since r1 and r4 are not altered by GetBlock or SetDevice, those values remained the same and did not need to be set up again. If we were going to save the block of data to a different sector, then r1L and r1H would have needed to be altered prior to the call to PutBlock.

The code above would have failed if drive B did not exist. The call to PutBlock would actually rewrite the block back to drive 8. It would do no good to check for any errors because there would be none. Everything would appear to work correctly to the application. The only problem is that we just altered a sector that we did not want to alter. Imagine what would happen if we were changing the directory blocks or some other vital portion of the disk. That could prove to be a very bad situation.

The Cure For SetDevice

You still need to use SetDevice, but it's just too bad it doesn't check for errors like it was supposed to do. Instead, you are going to have to actually check some variables in the GEOS kernal yourself to see if a drive exists before attempting to access it. These variables are stored in four locations at driveType. There are 4 bytes here, one for each drive. The following code will determine if there really is a drive B online.

```
ldy #9
lda driveType-8,y
```

With that little bit of code, you can do a branch on equal (beq) for non-existant drive, or a branch not equal (bne) if a drive exists. Basically, if a zero is at the location you are checking, then there is no drive. Any non-zero will indicate a drive does indeed exist and you can also identify the type of drive there. On the same token, the variable curType always indicates the type of drive that is currently active according to curDrive. SetDevice copies a byte from one of the driveType locations to curType for you.

Is The Turbo Code Running?

Now that you know how to get access to a drive, how do you know if the turbo code needs to be turned on or sent to the drive. The good thing is that we don't really need to know. Routines such as PutBlock or GetBlock will perform the task if needed. You can do it if you'd like, but it's not necessary. A call to EnterTurbo will do the job. All the higher level routines call this function for you, but the lower level routines do not. The lower level routines expect that it has already been called and will fail if it hasn't. If you use SetDevice to switch drives and then do a low level disk access, your program will crash. Let's say you are accessing drive A and then switch to B as in the following code:

```
lda #9
jsr SetDevice
jsr InitForIO
LoadW r4,#diskBlkBuf
LoadB r1L,#1
LoadB r1H,#0
jsr ReadBlock
jsr DoneWithIO
```

This code did not turn on the turbo code, or install it in the drive if it was not already there. After the call to SetDevice, you should do a JSR to EnterTurbo. This example turns out to be really meaningless because we could have used GetBlock instead and avoided calling InitForIO and DoneWithIO. We only read one block with above code, and GetBlock does all that and reads one block. It also calls EnterTurbo. So why would we want to use ReadBlock when it requires more code to use? If we were going to read a number of blocks at one time, then repeated calls to just ReadBlock within that above routine would be faster than repeated calls to GetBlock. We would only be calling InitForIO and DoneWithIO one time instead of GetBlock calling them each time a block is read.

One More Time

SetDevice has one more important use. Printer drivers call it to set up the serial bus for printer access. The geoCable drivers also call it even though they do not access the serial bus. This allows GEOS to do any needed housekeeping prior to the printer access. The variable curDevice will also be set to device 4 but curDrive will remain at whatever drive is currently active. For this reason, after your application calls any printer driver routine for printer access, it should call SetDevice before doing any disk access:

```
lda curDrive
jsr SetDevice
```

This will insure that everything is back in place for you. As long as you load the accumulator with the value from curDrive, you can be pretty much assured that the drive is there or curDrive never would have been given that value in the first place. If curDrive contained a zero, you might get into trouble, but about the only time that curDrive is set to zero is during a drive swap which usually only occurs from the Desktop.

Please make use of the four drive capability that the user wants you to do, but just remember to only try accessing the drives that are actually online. People tend to shy away from using your program is if it has a tendency to trash disks.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

ASSEMBLY LINE

NUMBERS AND ARITHMETIC

By Jim Butterfield

Many programmers get a little nervous when it comes time to deal with numbers. Numbers are not all that difficult, and they are useful...how else can you put high scores on your games?

ASCII Numbers

The numbers we read and write are ASCII text. Press the "6" key, and the computer will receive a value of 54, which is the ASCII character for 6. Subtract 48, and you'll get the binary value 6. Input a number such as 789, and the computer gets three ASCII characters, one for each digit.

ASCII text is necessary for input from the keyboard and from files, where numbers are often held as text. They are also needed for output to printer or screen, so it would be true to say that numbers always start and end in their ASCII form. Some numbers stay in ASCII form, never changing to anything else. You won't need to do arithmetic on such numeric strings as telephone numbers or zip codes. Keep these numbers in ASCII.

Binary Numbers

The most compact way to store numbers is in binary form. A single byte can hold values from 0 to 255; compare this to the ASCII range of a single character byte, which goes from 0 to 9. Binary numbers are great for arithmetic. The "add and subtract instructions" are ready to go (ADC and SBC), and it's not hard to work through multiplication and division subroutines if needed. The challenge is that you can't input or output binary numbers; you have to convert from or to ASCII. This is not really a problem—we'll get to that code fairly soon.

Compromise: BCD Numbers

Halfway between ASCII and binary numbers, there's a compromise called BCD, which stands for Binary Coded Decimal. Each byte will contain two decimal digits from 0 to 9: one in the high four bits (the "high nybble"), and the other in the low four. A BCD byte can hold a value from 00 to 99, which is a heck of a lot better than the 0 to 9 range that ASCII gives you, but it's not as good as the 0 to 255 of binary.

BCD numbers are fairly easy to convert to ASCII for output: just grab the four-bit value representing a digit, trim it up to the ASCII numeric character range (for example, by adding 48), and out it goes. Input is just as easy.

BCD numbers are also pretty good for addition and subtraction; the 6502 processor has a "decimal mode" making it a snap. Multiplication and division and other advanced math isn't as easy, binary numbers do a better job.

Comparison and the C Flag

We talked about flags the last time around. It was mentioned that if you wanted to compare the size of two numbers, the C flag is the one to check. After a comparison (with CMP, CPX, or CPY), the C flag will be SET if the register value is greater than or equal to whatever you're comparing to. Conversely, the C flag will be CLEAR if the register contains a lower value than that of the operand. Beginners often think that the BPL (Branch Plus) and BMI (Branch Minus) commands will signal greater than or less than. Not so...stay with the C flag and its tests, BCS and BCC.

How do we test an incoming ASCII character to confirm that it's a valid numeric character? Here's the code, assuming that the character is in the A register:

```
CMP #$3A      ;if it's bigger than "9", hex 39...
BCS TOO_BIG   ;...it's too big to be numeric;
CMP #$30      ;if it's not bigger than "0", hex 30...
BCC TOO_SMALL;...it's too small to be numeric.
```

If the program doesn't take either branch above, the A register contains a valid numeric digit. It could now be reduced to binary with a command such as AND #$0F. You would use the same kind of coding to identify an alphabetic character.

Program Preview

The program given here is something of a change of pace. Instead of being plain vanilla coding, it uses a number of tricks. Try to figure them out, it's good exercise.

Here's what the program does: it allows you to type in a number of one or two digits, then press the "+" key, then a second number, and finally the "=" key. It will calculate a total and print it. Thus, if you typed: "45+36=", the computer would complete the line by adding "81".

Note that only the keys named can be used. RETURN will be useless: all you can press is the numeric keys, the "+" key, and the "=" key. A good revision to the program would be to allow the STOP key to be recognized (use JSR $FFE1 to test the stop key; if it's pressed, BEQ will branch you to the exit code of your choice). In the interest of keeping things brief, the code given here doesn't even check STOP.

This program will run on almost any Commodore machine ever built. If your tiny VIC-20 doesn't have memory at address 8192 (hex 2000), you may have to adjust things slightly.

Gimmicks and Gadgets

The code in this program is a little off the beaten path. I will note some of the key points of interest as I move through the code. The first part (hex 2000 to 2009) clears the input area, which ranges from $2100 to $2106:

```
START   LDA #$00      ;value to store
        LDX #$06      ;number of locations-1
```


http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

```
CLRLOOP STA $2100,X
        DEX
        BPL CLRLOOP
```

At $200A, we get a character from the keyboard. We always loop back here to get another character.

```
GETCHR  JSR $FFE4     ;get from keyboard
```

Trick number one: we are counting the characters received in address $2100. If we have received exactly two characters, we will skip ahead to look for the "+"; if we have received exactly five, look for the "=" key.

```
        LDX $2100     ;character count
        CPX #$02
        BEQ CKPLS     ;if two, check 'plus'
        CPX #$05
        BEQ CKEQU     ;if five, check 'equal'
```

Now we check to see if our received character is a valid ASCII numeric, as demonstrated this method earlier.

```
        CMP #$3A
        BCS TOOBIG    ;branch if too big
        CMP #$30
        BCC TOOSM     ;branch if too small
```

At this point, we know we have a valid numeric character. We save it for the moment in the Y register, and convert the value to binary with the instruction. The binary value is stored in the area at 2101 and above. Don't forget that X still contains the number of characters received, so this value controls the exact location where the binary value is stored.

```
        TAY
        AND #$0F
        STA $2101,X
```

Then we restore the original ASCII character back to the A register.

```
        TYA
```

Address 2027, SHOWCH, prints the character to the screen so that the user can see what was typed. We add one to the characters-received counter in X and store the value in memory. Then we read the keyboard again.

```
SHOWCH  JSR $FFD2     ;print character in A register
        INX
        STX $2100
        BNE GETCHR    ;we always branch to GETCHR, 200A!
```

If the input key is too small to be a numeric, it might be a "+" character, but we'll only accept that if one or two characters have been received so far. Here's the check for "one character":

```
TOOSM   CPX #$01
        BNE GETCHR    ;if not "one", back we go
```


CW & RUN BACK ISSUES

For years, *RUN* Magazine provided Commodore Users with a great source of information, and now CMD has given you *Commodore World*. Don't let this valuable information slip away—fill in the voids in your library now!

RUN Magazine Back Issues

Any 3 issues for $12.00, any 6 for $18.00, or any 12 for only $24.00

RMJAN89	January 1989	RMJUN90	June/July 1990
RMFEB89	February 1989	RMDEC90	December 1990
RMMAY89	May 1989	RMJAN91	Jan/Feb 1991
RMJUN89	June 1989	RMJUN91	JuneJuly 1991
RMJUL89	July 1989	RMJAN92	Jan/Feb 1992
RMAUG89	August 1989	RMMAR92	March/April 1992
RMSEP89	September 1989	RMMAY92	May/June 1992
RMOCT89	October 1989	RMJUL92	July/August 1992
RMSP89	Special Issue 1989	RMSEP92	Sep/October 1992
RMJAN90	January 1990	RMNOV92	Nov/December 1992
RMMAY90	May 1990		

Shipping: 3-6 issues - U.S. $3.00, Canada $5.00, Foreign $15.00; 12 issues U.S. $5.00; Canada $7.00; Foreign $20.00.

Commodore World Back Issues

$4.95 each, or any 3 for only $12.00

CW1	Commodore World Issue 1	CW10	*Commodore World Issue 10
CW2	Commodore World Issue 2	CW11	Commodore World Issue 11
CW3	Commodore World Issue 3	CW12	Commodore World Issue 12
CW4	Commodore World Issue 4	CW13	Commodore World Issue 13
CW5	Commodore World Issue 5	CW14	Commodore World Issue 14
CW6	Commodore World Issue 6	CW15	Commodore World Issue 15
CW7	Commodore World Issue 7	CW16	Commodore World Issue 16
CW8	*Commodore World Issue 8	CW17	Commodore World Issue 17
CW9	Commodore World Issue 9	CW18	Commodore World Issue 18

Shipping: U.S. and Canada $2.00 for first issue, plus $1.00 per additional issues.; Foreign $5.00 per issue. *Indicates issues out of print–Xerox copy supplied.

TO ORDER CALL 1-800-638-3263

Computer Bargain Store

(801)466-8084

Specializing in NEW and USED Commodore Hardware, Software and Accessories at excellent prices.

Send $1.00 for a HUGE list of products. Office Hours: 11:30 - 6:30 MST. Visa, MC, Discover and American Express accepted.

3366 South 2300 East, Salt Lake City, UT 84109

Phoenix 64

A MAGAZINE FOR USERS OF THE C64/128

The Commodore appears poised to rise from the ashes like the Phoenix of old. With the SuperCPU and CMD's venture toward a new computer, a magazine is needed to give Commodore owners an expert source that is up close and personal.

Phoenix 64 is designed for the beginning user who wants to advance, for the advanced user who wants to be on the cutting edge, and for the Commodore observer who wants to witness it all. Order now for the premier issue of ***Phoenix 64***. (No subscriptions.)

Make checks payable to:
Roger Lawhorn
P. O. Box 8053
New Albany, IN 47151

USA: $3.00/issue
CANADA and MEXICO: $4.50
FOREIGN: $5.50

http://www.oldgamesitalia.net/
http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Then, if one character has already been received, we will drop through to the following code. If two characters have already been received, we will leap to this point from an earlier point in the program. In either case, the task at hand is to check for a "+" character, hexadecimal 2B.

```
CKPLS   CMP #$2B
        BNE GETCHR    ;if not "+", forget it
```

If we have received two numeric characters so far, we can print the plus sign and keep going.

```
        CPX #$02
        BEQ SHOWCH
```

If we got only one numerical character, we have to move it from the "tens" digit position to the "ones" digit position, placing a zero value in the tens position. We add one to the character count in X to allow for the ghost zero in the tens position. After that, we can print the plus and continue.

```
        INX
        LDY $2101
        STY $2102
        LDY #$00
        STY $2101
        BEQ SHOWCH    ;we ALWAYS branch.
```

The coding to check for the "=" character is very similar to the above stuff for "+". The main differences are that we're looking for this to follow 4 or 5 input characters; and, after we do find that equals character, we finish the program by doing the arithmetic.

```
TOOBIG  CPX #$04
        BNE GETCHR    ;not 4 characters, forget it!
```

After five input characters, we leap directly to the following code:

```
CKEQU   CMP #$3D
        BNE GETCHR    ;not an '=', go back
```

We have the equals sign. Print it.

```
        JSR $FFD2     ;print character in A
```

If only one digit was received for the second value, we must reorganize the "tens" and "ones" values, as before.

```
        CPX #$05
        BEQ $2065     ; if the whole five, skip ahead
        INX
        LDY $2104
        STY $2105
        LDY #$00
        STY $2104
```

The following arithmetic is done as BCD, but the stored values have only one digit to a byte, instead of two! This would normally give problems with the Carry operation as we go from one digit to the next. If the most we can add is 9 plus 9, we'll never go over 99 and trigger the Carry flag for the next column. This problem is resolved in the code below, but I'll leave it as a puzzle for you to look at. How do I make the carry flag do its work, and how do I handle the possible 3-digit total, such as we would get with 99+99=...?

```
        SED           ;set BCD mode!
        CLC           ;prepare to add!
        LDA $2102
        ADC $2105
        TAY
        CMP #$10      ;adjust carry flag
        LDA $2101
        ADC $2104
        TAX
        CLD           ;no more addition
        CMP #$10      ;adjust carry flag
        BCC TWODIG
        LDA #$31
        JSR $FFD2
TWODIG  TXA
        BEQ ONEDIG
        ORA #$30
        JSR $FFD2     ;make ASCII, print
ONEDIG  TYA
        ORA #$30
        JSR $FFD2     ;and again
        LDA #$0D
        JSR $FFD2     ;print RETURN
        RTS           ;all done.
```

Listing: ARITHMETIC.POKE

```
100 DATA 169,0,162,6,157,0,33,202,16,250
,32,228,255,174,0,33,224,2
110 DATA 240,32,224,5,240,54,201,58,176,
46,201,48,144,16,168,41,15
120 DATA 157,1,33,152,32,210,255,232,142
,0,33,208,218,224,1,208,214
130 DATA 201,43,208,210,224,2,240,235,23
2,172,1,33,140,2,33,160,0
140 DATA 140,1,33,240,221,224,4,208,188,
201,61,208,184,32,210,255
150 DATA 224,5,240,12,232,172,4,33,140,5
,33,160,0,140,4,33,248,24
160 DATA 173,2,33,109,5,33,168,201,16,17
3,1,33,109,4,33,170,216,201
170 DATA 16,144,5,169,49,32,210,255,138,
240,5,9,48,32,210,255
180 DATA 152,9,48,32,210,255,169,13,32,2
10,255,96
200 FOR J=8192 TO 8340
210 READ X:T=T+X
220 POKE J,X
230 NEXT J
240 IF T<>17405 THEN STOP
300 PRINT "SIMPLE ADDER."
310 PRINT "TYPE: 1 OR 2 DIGITS, '+', 1 O
R 2 DIGITS, '='"
400 SYS 8192
```


http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

CHECKSUM

Commodore World's Program Entry Checking Program and Tips on Entering Programs from this Magazine

CHECKSUM is a program that proofreads your typing when you enter a listing from the magazine. It assigns a numerical value to each character that you type, adds up the values of the line you typed and displays the sum. (Checksum, therefore, means that it checks your typing by summing the characters.) It also verifies that you have typed the characters in the proper order. (Checksum won't tell you if you miss a line of code entirely, so verify that yourself.) Checksum runs "in the background" when you type in lines of program code. Whenever you type a line and press RETURN, Checksum will display a value. Compare that value to the value published next to the line of code in the magazine. If the numbers match, you've typed the line correctly. Simple.

Typing in CHECKSUM

First, type in Checksum carefully from the listing on this page. Be sure to press RETURN after every line to enter it into memory. Once you have typed the program, *save it*. In fact, save it a few times while you're typing, just to be safe. (This is good advice whenever you type in a program. I usually change the name each time I save; for example, Checksum1, Checksum2, and so on.) Double-check your work, making sure that you've typed in every line and that you've pressed RETURN after every line you've typed. If you make errors when typing in Checksum, a test run of Checksum will tell you which line is incorrect. (This safety feature works only in the Checksum program itself, and does not apply to any other listings in the magazine.) Whenever you find a typing error (in any program listing), fix it, press RETURN to enter the change, save the program again and try another run. Repeat this process as often as necessary. Important tip: Don't get discouraged if the program won't run. Be patient. Be thorough. It will work eventually. You'll know your Checksum is ready when you see the line:

```
TO TOGGLE ON OR OFF, SYS XXXX
```

Entering Programs Using CHECKSUM

When you're ready to type in your first listing from the magazine, load and run Checksum. Make a note of the number that is displayed on the screen (49152 for the C-64; 3328 for the C-128). To activate and deactivate Checksum, type SYS followed by that number, then press RETURN. You need to have Checksum active whenever you're typing in a listing. Checksum must be deactivated, however, when you run the new program. The next step is typing in a new program listing as it appears in the magazine.

As you begin, you'll notice that to the left of the start of each line is a number. Don't type this number in: It's simply the Checksum value. Stop typing at the end of the program line and press RETURN. If you've typed the line correctly, the number displayed on the screen will match the Checksum value. If the numbers don't match, you've made a mistake. Check the line carefully, make your changes and press RETURN. The computer won't know you've made a change unless you press RETURN on the changed line to enter it. A few type-in hints: The Checksum does not verify blank spaces in the program lines unless they are within quotation marks, because adding or omitting such spaces will not affect the operation of the program. The exception to this is hexadecimal Data statements. These are the Data statements, such as this one, that don't have commas:

```
100 DATA 12345678901234567890*123456789012345
67890*12345678901234567890*
```

In statements such as these, you must have one space between the word DATA and the numbers that follow. Checksum will not catch that error.

Special Key Combinations

As you type, you may be confused the first time you see curly braces {}. These braces mean "perform the function explained within." For example, {22 SPACES} means that you need to press the space bar 22 times. Don't type the braces (you can't, of course, because there are no curly braces in the Commodore character set). Here are some other common examples:

{CLEAR/HOME}	hold down the SHIFT key and press the CLR-HOME key.
{2 CRSR DN}	tap the cursor down key twice.
{CTRL i}	hold the CONTOL key and press the I key.
{CMDR t}	hold down the COMMODORE key and press the T key.

Continue typing in your program, saving often and checking each checksum value with the one in the magazine, until you've finished the listing. Phew! So now you're ready to run your program, right? Not quite. First, save it. Second, deactivate Checksum by typing SYS followed by 49152 for the C-64 or 3328 for the C-128. Now you can run. Don't be discouraged if you still get an error. It happens. Use Checksum faithfully. Be patient. Be thorough. It will work eventually.

CHECKSUM

```
100 rem cw checksum 64/128
110 mo=128:sa=3328
120 if peek(65533)<>255 then mo=64:sa=49152
130 i=0:ck=0:ch=0:ln=300
140 for k=0 to 16
150 for j=1 to 10
160 read b:if b>255 then goto 280
170 ch=ch+b:poke sa+i,b:i=i+1
180 next j
190 read lc:if lc<>ch then goto 280
200 ch=0:ln=ln+10
210 next k
220 pokesa+110,240:pokesa+111,38:pokesa+140,234
230 printchr$(147):print"cw checksum";str$(mo):print
240 print"to toggle on or off, sys";sa:if mo=128 then 270
250 pokesa+13,124:pokesa+15,165:pokesa+25,124:pokesa+26,165
260 pokesa+39,20:pokesa+41,21:pokesa+123,205:pokesa+124,189
270 pokesa+4,int(sa/256):sys sa:new
280 print"you have a data error in line";ln;"!":end
290 rem do not change these data statements!
300 data 120,162,24,160,13,173,4,3,201,24,884
310 data 208,4,162,13,160,67,142,4,3,140,903
320 data 5,3,88,96,32,13,67,152,72,169,697
330 data 0,141,0,255,133,176,133,180,166,22,1206
340 data 164,23,134,167,132,168,170,189,0,2,1149
350 data 240,58,201,48,144,7,201,58,176,3,1136
360 data 232,208,240,189,0,2,240,42,201,32,1386
370 data 208,4,164,180,240,31,201,34,208,6,1276
380 data 165,180,73,1,133,180,230,176,164,176,1478
390 data 165,167,24,125,0,2,133,167,165,168,1116
400 data 105,0,133,168,136,208,239,232,208,209,1638
410 data 169,42,32,210,255,165,167,69,168,170,1447
420 data 169,0,32,50,142,169,32,32,210,255,1091
430 data 32,210,255,169,13,32,210,255,104,168,1448
440 data 96,104,170,24,32,240,255,104,168,96,1289
450 data 56,32,240,255,138,72,152,72,24,162,1203
460 data 0,160,0,32,240,255,169,18,208,198,1280
```


http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

PERIPHERAL VISION

KEYBOARD TIPPING

By Jim Butterfield

1. During INPUT, pressing RETURN tells the computer to look at the screen for its data, not at the keyboard. Of course what's on the screen will usually have been delivered from the keyboard, but not always.

2. Pressing SHIFT-RETURN tells the computer nothing; it just gets you off the current screen line and out of programmed-cursor mode (that annoying "reverse-character" thing). This is very handy if you've messed up your input.

3. Typing CHR$(14) puts the screen into text mode; typing CHR$(142) puts the screen into graphics mode. This works with all Commodore 8-bit computers, except the very earliest models of the PET.

4. On Commodore computers since the VIC-20, pressing SHIFT-COMMODORE toggles the screen between text and graphics mode. You knew that, didn't you?

5. On the VIC-20 and Commodore 64, you can disable that screen/text toggle by printing CHR$(8). Restore it by printing CHR$(9). On the 128 (and the Plus-4/C16), use CHR$(11) and CHR$(12).

6. Because of the different characters used to disable the above toggle on various machines, many programmers prefer to pass on this character, and instead print CHR$(14) or CHR$(142). If the user plays with the SHIFT-COMMODORE keys, the above will put things back the way the programmer wants them.

7. In terms of keyboard mechanics, it's possible (in principle) to detect any two keys pressed at the same time. But as a general rule, there's no way to detect all possible 3-key combinations.

8. Commodore 8-bit keyboards are set up as an array of "rows" and "columns". When a key is pressed, it makes a connection between a specific row and column. See Figure 1 for the layout of the VIC-20 and Commodore 64 keyboard.

9. When testing the keyboard, the computer puts a voltage down each row in turn, and watches to see which columns pass the voltage back. You can write the code to do this yourself, but it's a little complex, and the interrupt routine usually does the job for you nicely.

10. Two keys are no problem-as each row is selected, signals may come back on two columns simultaneously, or may came back as different rows are selected. The computer can sort out which two keys are involved either way.

11. Three keys are not always resolvable. Refer to Figure 1, and look at what happens if the user presses keys "E","Z",and "U" at the same time. When the row marked R2 is tested, response will come back on columns B6 and B4, which is correct (detecting "E" and "Z"). When a voltage is put onto row R4, it will run up column B6 and from there (through the "E" connection) along row 2 as well; then the voltage will make its way to B4, so that the "B" key will appear to be pressed. This effect is called a "ghost" key.

12. Practical result: the interrupt services of the computer expect only two keys to be pressed at a time. If two are pressed, one will usually be a shift-type key.

13. Note that the left and right shift keys are separate switch points on the keyboard, but you'd have to write your own coding to detect the difference between left-shift and right-shift.

14. The "bottom row" of keys (R8 in Figure 1) is especially easy to check, since a copy of the "columns" it triggers is kept in memory. On the VIC-20 and Commodore 64, and Commodore 128, this data is kept at address 145. On many pre-Vic-20 machines it's at 155. The keys mapped into this row may not be the same between different machines.

15. Values shown at the "keyswitch" address above tend to be inverted. In other words, when the line is energized, the corresponding bit is turned OFF. With no keys pressed, you'll see a value of 255 here.

16. Figure 1 shows that the keys logged into the "keyswitch" address for the Commodore 64 and similar machines, are (high end to low): Stop, "Q", Commodore, Space, "2", Ctrl, back-arrow, up-arrow. Basic would have a tough time detecting the Stop key with such a PEEK(), of course, since Basic would stop before it could do the test.

17. A Basic program could, however, ask the user to press a key combination such as Ctrl, Space, and back-arrow. When address 145 shows a value of 233, the computer will know that this combination has been pressed. (We start with 255, no key, and subtract 16 for Space, 4 for Ctrl, and 2 for back-arrow, giving us a result of 233). A handy way to set up an emergency program exit or "backdoor" code.

18. It doesn't matter if you tap a key or hold it down, the interrupt routines that check the keyboard won't register a key as being hit twice just because it has detected "key down" several times in a row. Of course, some computers have a "key repeat" feature, but that's different.

19. To help with this "debouncing" action, every computer has a location where it keeps "what the keyboard looked like last time I checked". The value is kept at address 203 on the VIC-20 and Commodore 64, at 151 on many pre-VIC-20

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

machines, and at 212 and 213 on the Commodore 128. The value is an internal code; it's not in ASCII/PETSCII.

20. The location just named is a good way to tell if a key is being held down. Games, especially, can benefit from repeating or sustaining an action as long as the key is held. Be aware that the "no key" value to be found in this location varies from machine to machine-possibly 64, 88, or 255. You should be able to research which value fits your computer.

21. Because the keyboard is read by interrupt routines, the values can change while your program is reading them. You need to be careful in choosing your sequence of tests.

22. The recommended way to have Basic check if a key is being held down is read the "key code" and store it. For example, on a Commodore 64 or VIC-20 you might code KC=PEEK(203). Now try to read the keyboard with GET K$. If you get a real key, not a null string, use it and ignore the peek value. So: IF K$<>"" GOTO 740. When you get a null string, check the results of that earlier PEEK; if it isn't the no-key value, the last-read key must still be pressed. Thus: IF KC<64 GOTO .. (where you'll repeat the previous key action).

23. We all know that you can "type ahead" into the keyboard buffer. Keyboard buffers typically hold 9 characters; sometimes they can be adjusted to be larger, but that's rarely important.

24. Some programs want to be sure that the keyboard buffer is empty before starting a user dialogue. Although POKE commands are popular for this, the neatest way to empty it out is with command: GET X$,X$,X$,X$,X$,X$,X$,X$,X$ .. and you won't need to worry about whatever value ends up in X$.

25. The interrupt (IRQ) program kicks in 60 times per second, and checks the keyboard, putting any keys it finds into the keyboard buffer. Lots of machine language programmers like to "catch" the interrupt when it starts and add their own code. Be warned that this won't help you meddle with keyboard routines, since the keyboard will be checked AFTER the custom code, and the character might well be picked up and used before the next interrupt strikes.

26. If a programmer finds the need to dig in and modify keyboard action at the interrupt level, the job takes a somewhat more subtle approach called a "post-interrupt". I won't go into detail, but it involves catching the interrupt when it starts, and building a "fake" interrupt return. When the main interrupt code is finished, it "returns" the system to your post-code, which does its meddling and then REALLY returns to the interruptend point, requiring careful coding.

27. Alternatively, an ambitious programmer could write a complete set of interrupt code to replace those in ROM. This is not as easy as it might sound, especially on the Commodore 128, which has a large set of interrupt activities operating.

28. The easy way out of all this is just to have your program accept the characters as delivered to you by the keyboard routines, and modify them at that time. You can usually get away with this and save a lot of tricky coding.

29. Since keyboard input comes from the keyboard buffer, you can fake input by stuffing the buffer. (The computer is "typing on its own keyboard"!).

30. Since the main input stream comes from the screen, and you have limited space in the keyboard buffer, you can fake input by putting it on the screen and just putting RETURN characters into the keyboard buffer. Be sure to position the cursor accurately.

31. Why would a computer want to type its own input? Well, there are a few commands that behave differently, depending on whether they are given within a program or typed on the keyboard. An example would be the LOAD command.

32. A program can stop itself (with the screen set up and the keyboard buffer stuffed), change a line of its code, and then restart itself! Amaze your friends, but use this kind of thing sparingly.

33. Yes, you can disassemble and clean your Commodore keyboard. Some use alcohol applied with QTips. Some use detergent and water, followed by a cleansing rinse. Reports vary on the success of various methods. Be very careful with small springs (usually found under keycaps), they are difficult to pick out of a shag carpet!

	B7	B6	B5	B4	B3	B2	B1	B0
R1	CRSR-U/D	F5	F3	F1	F7	CRSR-R/L	RET	DEL
R2	RSHFT	E	S	Z	4	A	W	3
R3	X	T	F	C	6	D	R	5
R4	Y	U	H	B	8	G	Y	7
R5	N	O	K	M	0	J	I	9
R6	,	@	:	.	-	L	P	+
R7	/	↑	=	LSHFT	HOME	;	*	£
R8	STOP	Q	C=	SPACE	2	CTRL	←	1

Figure 1: Layout of the C-64 keyboard. Each Key is a switch that connects a row to a bit position column. The computer places a signal on each row (R1 to R8) and looks at what comes back in the bit positions.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

BASIC INSTINCTS

By David Pankhurst

This month's title is taken from the book of the same name by Jon Bentley. Bentley, a researcher at AT&T labs, wrote the book in the mid 1980's as a compilation of some of the columns he did on computer programming. This book is of interest to Commodore programmers as well as others because it deals with thinking about programming, rather than programming itself. In each essay, problems are spelled out, and various solutions are tried. Going through the book is an excellent way to "wrap your mind" around a problem, enabling you to approach it from all sides.

Besides various practical examples, he discusses the task of programming, encouraging good habits and techniques. Among them, he emphasizes the need to search out a good algorithm, rather than the first one that comes to mind; to analyze rather than trust specified requirements (which can sometimes be wrong); and to do back of the envelope calculations to get a feel for a practical solution. Along the way, he repeats the need to balance the frequently opposing forces: computer time, memory, and your time—all required to produce a program.

Find The Right Problem to Solve.

As an example of the book's content, the first chapter opens with a conversation between the author and a fellow programmer who needs to do a disk sort. After listing several options which don't seem to fit the requirements, he asks a few questions, digging deeper. The result was that the other programmer didn't need a disk sort per se, but felt he needed it to sort a large file that couldn't fit in memory (sound familiar?). Eventually, the problem was broken down into the need to sort at most 27,000 integers, ranging from 1–27,000, with each number appearing no more than once. Although that problem consisted of sorting electoral district numbers, a similar problem could occur with phone numbers, or social security numbers.

The programmer obviously felt sorting the file and printing the sorted list would do the trick. Benteley asks "is there a better way?", breaks it down further, and then solves it without the disk sort. Before I explain, try to solve it yourself.

The Easy Way

The key to simplifying the problem is to note that either a number is in the list, or it isn't (there's guaranteed to be only one of each number). Sounds like a binary decision, and so it is. The next point is that the range is from 0–27,000. If we use one memory byte per number to represent presence or non-presence, we can comfortably fit 27,000 one-byte flags in the C64's memory. Describing the problem, we would do the following:

1) set aside an area of memory that can store the 27,000 bytes
2) set them all to zero (indicating a number doesn't exist yet)
3) read in the list: for each number X, set the Xth byte in the array to one, indicating it's accounted for
4) after all are read in, go through the list in memory; for each position X in the array, print the number Xonly if it is turned on (indicating the number was read in)

The result is a sorted list without the sorting, saving a great deal of time and energy.

For simplicity, we use one byte to represent one number. With a little extra coding, however, we can use most of the 62K RAM available, and one bit per number, rather than one byte. This would let us sort up to half a million numbers (62K x 8 bits = 507,904 bits). Phone numbers? There are at most ten million phone numbers in any area code. Sorting phone numbers (none of them duplicates) would take just over a meg of RAM, such as found in a RAM expander.

It's this kind of non-linear thinking that fills the book—look for a solution by defining exactly what the problem is.

Build Safety Factors In

Few of us have heard of John Roebling, but many of us have heard of the Tacoma Narrows Bridge disaster. In the 1940's, a suspension bridge was caught up in a windstorm and was completely destroyed. Other suspension bridges of that era met a similar fate, but not the most famous, the Brooklyn Bridge. The reason? It's designer, Mr Roebling, created the bridge similar to the way the others had been built, accounting for the forces known to engineers of that day. However, rather than building it to that minimum standard, he engineered six times the required strength into the bridge. The result is a bridge standing long after many of its lighter contemporaries have broken up.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

When we program, do we put in 'safety factors'? For instance when we code, do we consider the following safe:

```
IF(X=45) GOTO 200
```

If X is always an integer, this could work. But if it's floating point, sometimes the roundoff can cause problems. A safer way to write this is:

```
IF (INT(X)=45) GOTO 200
```

Often, adding extra code to reconfirm what you already know makes sense from a defensive standpoint. As an example, you know that code passed to a subroutine will range from 30 to 40; you can check this inline with the code:

```
IF (X<30 OR X>40) THEN PRINT "ERROR IN SUB" :
STOP
```

While your program runs as expected, these lines are executed normally. But if a change elsewhere in your program makes X fall out of range, this line will catch it immediately. Defensive programming lets you find the problem now rather than trying to find a bug buried deep in code later.

Another example is mathematical error as with division by zero or a square root of a negative. This should never happen, but what if it does? As a possibility, return a wildly invalid result for error checking, or an error message. Another option is to return an almost correct result, such as a large number for division by zero:

```
100 IF (X<>0) THEN R=1/X : GOTO 200
150 R= 1E20 : REM LARGE VALUE HERE
200 normal processing here...
```

Books can (and have) been written about defensive programming—the key is to always question: what if this variable isn't what I think it is—what next? Then, prepare for what you can, over compensating, as with the Brooklyn Bridge.

Divide and Conquer

Another interesting chapter of the book deals with divide and conquer—the binary search. When we look up a number in a phone book, we would never consider going from the start, and moving page by page (unless we're trying to find AAA Dry Cleaners) We instead open to the approximate area where the name should be, then a little forward or back, narrowing down our search to the correct name. A binary search is much the same. Rather than guessing where to start (something computers are notoriously bad at) one easy way is to tell it to divide the list in half, and then look at that halfway point. If it matches, you're done; if not, then the item (if it's there at all) is either in the top half of the list, or the bottom half. Repeatedly subdividing these halves by half again narrows down the search to one final item, a match (if the item is in the list) or not (if it isn't). Each check eliminated half the remaining list, so the number of searches needed is related to the power of two. A 256 item list can be searched in no more than 8 searches (with a chance of being shorter than that), and a million items need take no more than 20 comparisions. The key to this is that the list must be sorted. Since comparisons let the computer decide which section of a list to eliminate, numbers out of place may never be found.

Binary searches, for all their power, are notoriously difficult to program (Jon's book actually considers the algorithm in three different chapters, each time refining it). Rather than trying to write your own, here's a version for the C64:

```
0 REM BINARY SEARCH DEMO PROGRAM
5 REM GET 300 RANDOM NUMBERS FROM 1-1000
10 X=300 : N=1000 : GOSUB 1000
15 REM SEARCH THE LIST OF 300 NUMBERS FOR
MATCHES
20 N=300 : PRINT : PRINT "PICK A NUMBER FROM
1 TO 1000 "; : INPUT T
100 REM BINARY SEARCH
110 REM SEARCH A(1) TO A(N) FOR ITEM T
120 L=1 : U=N : C=0
130 M=INT((L+U)/2) : C=C+1
140 IF (A(M)<T) THEN L=M+1 : GOTO 170
150 IF (A(M)>T) THEN U=M-1 : GOTO 170
160 IF (A(M)=T) THEN P=M : GOTO 190
170 IF (L<=U) GOTO 130
180 PRINT "NUMBER" T "IS NOT IN THE LIST" :
GOTO 20
190 PRINT "ITEM" P "IS" T "FOUND IN" C
"TRIES" : GOTO 20
1000 REM SELECT X RANDOM NUMBERS FROM 1 TO N
1010 DIM A(X) : I=0: S=X : R=N : PRINT
"RANDOM NUMBERS: 1 -" N
1020 IF ( RND(0) > (S/R) ) GOTO 1040
1030 PRINT I; : S=S-1 : A(X-S)=I
1040 R=R-1 : I=I+1 : IF(S>0) THEN GOTO 1020
1070 RETURN
```

Lines 1000–1070 create an array of 300 random numbers in order, running from 1 to 1000, and print them out. Then the program lets you search for numbers, telling you if they are in the list or not. As you run it, you'll find that with 300 numbers, all matches can be found in 9 or fewer comparisons.

To use this code yourself, create an array of data, and call line 100 with the array size. And of course, make sure array A() is in order.

Random Thoughts

Obviously, I enjoyed the book. If you have the opportunity, get a copy for yourself. A book like this is an asset for programmers, giving insight into how others work in our profession, and their ways of thinking about problems. Even if you don't program a great deal, it's an interesting read.

As a final item, look back at the previous listing, where we needed to generate random numbers to test the binary search. If you've ever tried your hand at that, you know it can be annoying to get it just right. What we often need is an evenly distributed list of random numbers, with no duplicates, over a certain range. Lines 1000–1070 do that for us. We specify the range in N, and the array size in X. Although the routine may look odd, it is perfectly correct.

It would take pages to explain how it works (consult the book Seminumerical Algorithms by Donald Knuth for proof), but all you need to know to put it in your programs is here. It will generate randomly distributed numbers from 1 to N, giving you X numbers in order. It can be useful for games, such as cards. Instead of fiddling with arrays, just ask for 5 cards from a deck, and you're guaranteed to get them.

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

816 BEAT

By Doug Cotton

While *816 Beat* made its *Commodore World* debut in the *Assembly Line* column presented in Issue #17, this time we get our own masthead. Therefore, it seems only fair that we define just what the purpose of this column is before we move forward.

With the advent of the 65816-based SuperCPU recently released by CMD, we feel it is important to assist programmers in making a smooth transition to the powerful capabilities available in this most advanced member of the 65-family of microprocessors. So the main focus of this column, at least initially, will be just that: show programmers how to take advantage of that power. We'll also cover programming issues specific to the SuperCPU, and methods for dealing with this device. In addition, we'll occasionally present information on some related products that we feel certain will be of interest to 65816 programmers.

You may wonder just why we find these issues so important, and that's a fair enough question. The short answer is that the SuperCPU can provide additional longevity for Commodore 8-bit computers. But to do that most effectively requires new software. Providing programmers with useful information is a key element in making that happen.

Some folks have pointed out that other 65816-based accelerators have been created for the Commodore in the past, and don't understand why the CMD SuperCPU is of any more importance than these. I think it's fair to say that there are several good reasons. In no particular order, here are some that come immediately to mind:

- Speed: The SuperCPU operates at over double the speed of any accelerator previously released for the Commodore.
- Compatibility: The wide range of compatibility with both hardware and software provided by the SuperCPU is unmatched by.
- Expandability: Unlike other accelerators, the SuperCPU offers the ability to expand system memory to the 65816's full capacity.
- 128 Version: While presently in development, the SuperCPU 128 will be the first accelerator ever produced for the 128, giving both 64 and 128 users the ability to enhance system speed.
- NTSC & PAL: It doesn't matter where you live or which video standard you use, the SuperCPU works.

There are other reasons as well, but I think these are sufficient to illustrate the point that the SuperCPU has the technical capabilities—and the distribution—to make it the most widely accepted accelerator ever produced for the Commodore 8-bit computers. SuperCPU owners have also identified themselves as users who are willing to pay for products that extend the capabilities of their computers.

In simpler terms, *816 Beat* has been created to help you, as a programmer, meet the needs of a newly defined market. And that market, in turn, will grow as more optimized software becomes available for it.

16-bit Division

Of the four main mathematical routines that we commonly use in programs, division is probably the least often used; but when it is, it is without a doubt a cycle-hungry beast in need of taming. This makes it a natural candidate for native 65816 code.

In the course of hunting for a division routine to present here, I looked at a number of reference works containing 6502 division routines. One of the most extensive of these was an article published several years ago in *Transactor* magazine. While most of the resources I checked promoted repeated subtraction to perform division, the Transactor article correctly concluded that the subtraction approach is extremely inefficient when dealing with large numbers, and presented a routine that gave a more flat performance. While the speed of that routine was indeed quite good, the division routine presented by Lichty and Eyes in The Western Design

65816 Mode Switching Routines

```
gonatv clc          enter 65816
       xce          native mode
go16   rep #$30     full 16-bit
go8    sep #$30     8-bit
goem   sec          set emulation
       xce          (6502) mode
```

The routines listed here are those you'll need most often when working with native code on the 65816 microprocessor. The routines to the left use the standard 65816 mnemonics and require an assembler which fully supports the 65816 instruction set; the routines to the right are equivalent to the routines on the left, but can be used by any standard 6502 assembler.

```
gonatv clc          enter 65816
       .byte $fb    native mode
go16   .byte $c2,$30 full 16-bit
go8    .byte $e2,$30 8-bit
goem   sec          set emulation
       .byte $fb    (6502) mode
```


http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Center's *Software Manual* gave a slightly better overall performance (after fixing a bug in the routine [*Thanks go to Jim Brain for coming up with the bug-fix -Ed.*]). The routines presented here, therefore, are based on on the latter reference, in order to make sure we're starting out with fast routines to begin with. It may be worth noting that faster division routines are possible if specialized circumstances are taken into account; however, for general purpose 16-bit division, this routine is the fastest overall that I've seen to date.

Looking at the 65816 version of the code, it provides a savings in time of around 43 percent. In addition, the 65816 code takes only 42 bytes, versus 72 bytes for the 6502 code (plus 6 bytes of variable data for each). This provides a code-space savings of almost 42 percent. You will, however, lose some of those gains in entering and leaving 65816 native 16-bit mode (use *gonatv* and *go16* to enter, and exit with *goem*), if that is necessary in your particular program. The loss in time is minimal, though, since a single division often requires several hundred cycles.

Where Next?

With coverage of all the basic math routine conversions now complete, we'll take a look at dealing with timing routines in our next installment. Naturally, whenever we have programs that need to run on different speed processors, finding a means of producing fixed delay times becomes very important. Be sure to join us!

6502 16-bit Division Routine

```
divide lda #0          (2)
       tax             (2)
       pha             (3)
       ldy #1          (2)
       lda divsor+1    (4)
       bmi div2        (3 if taken, 2 if not)

div1   iny             (2)
       asl divsor      (6)
       rol divsor+1    (6)
       bmi div2        (3 if taken, 2 if not)
       cpy #17         (2)
       bne div1        (3 if taken, 2 if not)

div2   sec             (2)
       lda divdnd      (4)
       sbc divsor      (4)
       pha             (3)
       lda divdnd+1    (4)
       sbc divsor+1    (4)
       bcc div3        (3 if taken, 2 if not)
       sta divdnd+1    (4)
       pla             (4)
       sta divdnd      (4)
       pha             (3)

div3   pla             (4)
       pla             (4)
       rol             (2)
       pha             (3)
       txa             (2)
       rol             (2)
       tax             (2)
       lsr divsor+1    (6)
       ror divsor      (6)
       dey             (2)
       bne div2        (3 if taken, 2 if not)

       pla             (4)
       sta quotnt      (4)
       stx quotnt+1    (4)

       rts             (6)

divdnd .word 0
divsor .word 0
quotnt .word 0
```

65816 16-bit Division Routine

* Denotes changes required for assemblers that do not support 65816 mnemonics.

```
divide stz quotnt      (5)   [*replace with: .byte $9c]
                             [*add:          .word quotnt]
       ldx divdnd      (5)
       lda divsor      (5)
       ldy #1          (3)
                             [*add:          .byte $00]

div1   asl             (2)
       bcs div2        (3 if taken, 2 if not)
       iny             (2)
       cpy #17         (3)
                             [*add:          .byte $00]
       bne div1        (3 if taken, 2 if not)

div2   ror             (2)

div4   pha             (4)
       txa             (2)
       sec             (2)
       sbc $01,S       (5)   [*replace with: .byte $e3,$01]
       bcc div3        (3 if taken, 2 if not)
       tax             (2)

div3   rol quotnt      (8)
       pla             (5)
       lsr             (2)
       dey             (2)
       bne div4        (3 if taken, 2 if not)

       stx divdnd      (5)
       rts             (6)

divdnd .word 0
divsor .word 0
quotnt .word 0
```


http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

* CLASSIFIED ADS *

C64/128 PUBLIC DOMAIN. REQUEST FREE CATALOG OR SEND $2 FOR A DEMO & CATALOG. CALOKE IND., P.O. BOX 18477, RAYTOWN, MO. 64133. VISA-M/CARD ACCEPTED.

C=Hacking in Print! $6.00 Not simply a printout! Jim Brain, 10710 Bruhn Ave, Bennington, NE 68007. Printout of COMP.SYS.CBM FAQ: $12.00. Prices include shipping.

FOR SALE: Cardco numeric keypad for C-64 or Vic-20 with program disk, manual, adaptor board. $50.00-James Lambert, 1121 Williams Ave., Hastings, NE 68901-3820.

C-128/71 $139; 1802c/64/41 $179; Both with Dox/Cables/PS SHIPPED!! call John at 201-432-4669 SASE 4 list C=JEMS 88 Wallis Av Jersey City, NJ 07306

NO C64 USER SHOULD BE WITHOUT "ALL MY STUFF!" (FREE FROM SYNDICATED COLUMNIST H. BLAKE-KNOX, GRAND BEACH MB, CANADA). READ ABOUT 75 UNIQUE PROGRAMS!

* CLASSIFIED ADS *

ADVERTISERS INDEX

Caloke Industries ..... (Classified) 48
Commodore Country 31
Computer Power User 31
Commodore World ..... 5,29,33,Inside Back Cover
Computer Bargain Store 39
Creative Micro Designs 24-25,35,39,48
Genie ..... Inside Front Cover
J.P. Products by Mail 29
Loadstar 3
Parsec 29
Paxtron 9
Perfect Tax 29
Phoenix 64 39
Tech Star 31

Moving?

Don't forget to notify COMMODORE WORLD!

Please call or write with your change of address 6 to 8 weeks prior to your move so that you won't miss a single issue!

CW Address Change, P.O. Box 646,
E. Longmeadow, MA 01028
413-525-0023

CMD Service Center

AFFORDABLE • FAST • DEPENDABLE

Call Today 1-800-638-3263

Our Team of Technicians are Among the Most Qualified in the Industry!
Why Settle for Anything Less Than the Best?

We repair the following equipment: Commodore C-64, 64C, SX-64, C-128 and C128-D computers; 1541, 1541C, 1571 and 1581 Disk Drives plus CMD Devices. JiffyDOS Installations a specialty. All repairs warranted for 30 days. Minimum charge $35.00 plus parts and return shipping. You must contact CMD for authorization before sending any equipment.

Creative Micro Designs, Inc. P.O. Box 646 E. Longmeadow, MA 01028

COMMODORE WORLD
Classified Advertising Policy

Commodore World subscribers may place non-commercial classified advertising in *Commodore World* at a cost of $10.00 per issue. Your advertisement may contain up to 150 characters (including spaces). Commercial classified ads are charged at a rate of $10 per line. Send your advertisement with payment to: CW Classified Advertising, c/o Creative Micro Designs, Inc., P.O. Box 646, East Longmeadow MA 01028-0646.

Don't wait until it's too late...

RENEW EARLY!

Is your Commodore World subscription close to running out? Here's an easy way to check: look at the mailing label on the front of your copy. You'll find your subscription number and the expiration issue number. For example:

```
James Smith  12345EXP17
123 Home Street
Grand Rapids, MI 49502-0123
```

Jim's subscription will run out with Issue 17 as indicated by the EXP17 in his subscription code. Jim would be wise to re-subscribe early to avoid missing a single issue of Commodore World!

http://www.oldgamesitalia.net/ http://www.oldgamesitalia.net/

http://www.oldgamesitalia.net/

Shatter the 1MHz Barrier

SuperCPU

20 MHz Accelerators for the C-64 & C-128

BREATHING NEW LIFE INTO YOUR COMPUTER

THE SUPERCPU INCREASES YOUR COMPUTERS PROCESSING SPEED BY MORE THAN 20 TIMES! SIMPLY PLUG IT IN AND WATCH OLD PROGRAMS COME TO LIFE AND BEGIN DREAMING ABOUT THE POWERFUL NEW GENERATION OF SUPERCPU COMPATIBLE SOFTWARE FOR 1997!

What will the SuperCPU do for me?

Programs will suddenly spring to life—screens and menus pop up instantly, scrolling becomes fluid, and graphics fly. A C-64 equipped with the SuperCPU is like having a Volkswagen with a V-8. There's one small exception—the SuperCPU rides much smoother. Even though the SuperCPU gives your computer a radical increase in horsepower (up to 22 times faster), its operating system makes that power usable by maintaining compatibility with most existing software and making its operation transparent to the user.

Looking to the future, the powerful 65816 microprocessor gives programmers vast new resources to create powerful and sophisticated software. With its 16-bit registers, up to 16 MB of system memory, and 6502/6510/8502 emulation, the SuperCPU makes it easy to enhance existing software as well as providing the power to create Internet browsers, animation and other high-tech applications! The SuperCPU provides a bright future for a new generation of Commodore computing.

So join the Commodore revolution and order a powerful new SuperCPU TODAY!

SUPERCPU 64 $199.00*
SUPERCPU 128 $299.00**

* Plus Shipping: US $10 / AK,HI,PR $20; Canada $20
** $50 Deposits being accepted now. Available in 1997.

Ultra Fast • Compatible • Easy-to-use

- High-Speed microprocessor, 128K fast RAM, advanced hardware logic, and up to 512K ROM enable you to run all types of existing commercial software at speeds up to 22 times faster than stock machines.
- BASIC programs, including most Bulletin Board Systems, seem to run as fast as machine language, and compiled BASIC programs run faster than ever!
- Commercial machine language programs (databases, spreadsheets, word processors, telecommunications, graphics, etc.) run so fast that you'll think your running them on another computer!
- GEOS comes alive—No typing or scrolling delays, graphic operations happen instantly, faster printing and disk access! Includes enhanced GEOS setup utility!
- Easy-to-use: Plug it into your cartridge port and start working—no messy cables or special adjustments.
- Built-in JiffyDOS Kernal boosts disk access speed up to 15x faster with JiffyDOS equipped drives.
- Pass-thru port provides compatibility with RAMLink, SwiftLink, GEORAM, 17xx REU's and other cartridges.
- Unit Enable/Disable, JiffyDOS On/Off, Normal/Turbo Speed, and Reset switches make using the SuperCPU a snap. An internal connecector simplifies future expansion.

SPECIAL

SUPERCPU 64 WITH: RAMLINK 1MB $369.00 OR RAMLINK 4MB $409.00

Shipping & Handling: Cont. US $15.00 / AK,HI,PR $40.00 / Canada $25.00 / FOREIGN CALL

http://www.oldgamesitalia.net/
http://www.oldgamesitalia.net/

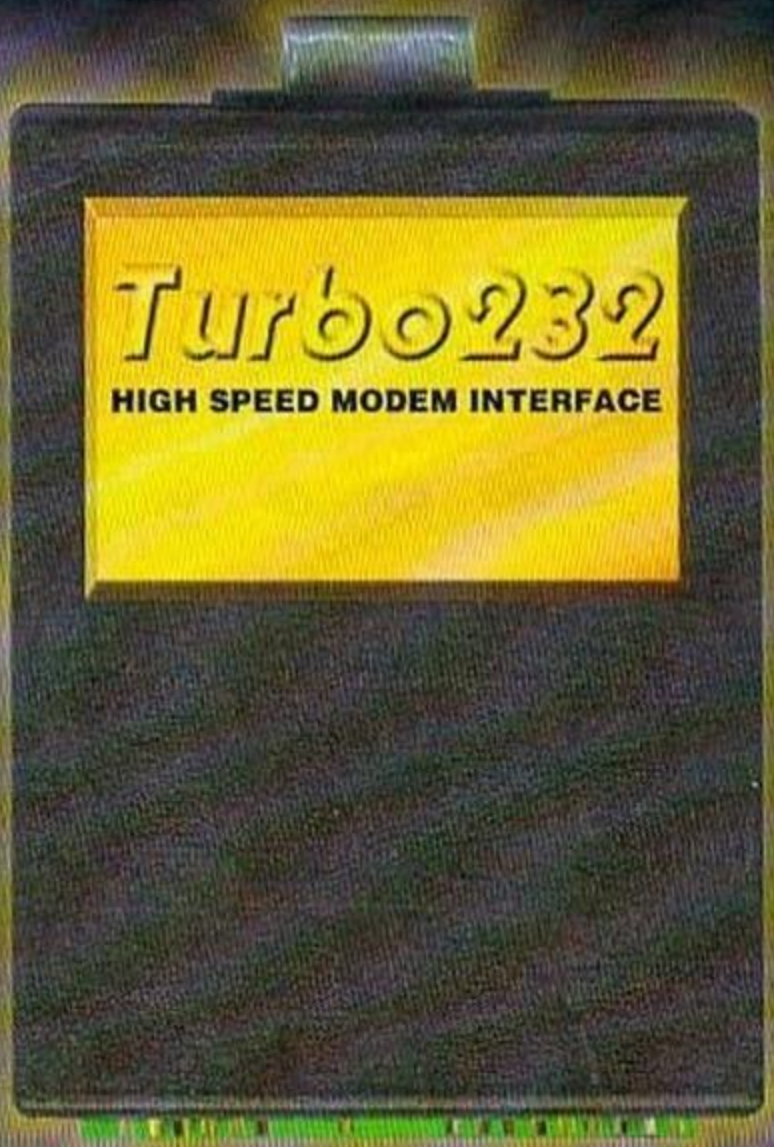
http://www.oldgamesitalia.net/

NEW

NEWS FLASH:
14.4/28.8 MODEMS NOW OBSOLETE!

The quest for faster internet access has made 33.6K modems the new standard, with 57.6K modems not far behind. SwiftLink and other first generation interfaces simply can't keep up—putting your Commodore in the slow lane on the Information Superhighway!

The all-new Turbo232 has been Creative Micro Designed to keep pace with the explosion in telecommunications technology!



- **High-Speed Support** Turbo232 keeps up with today's fastest modems, offering speeds up to 230Kbps
- **Easy-to-use!** Turbo232 simply plugs into the expansion port and connects to almost any external Hayes-compatible RS-232 modem
- **SwiftLink Compatible** Turbo232 has been designed to work with programs written for SwiftLink
- **Easy Configuration** Turbo232 has easy-to-configure jumpers for users with special requirements

- **Null Transfers** May also be used as a null modem interface for fast data transfers with other computers (i.e. PC, Mac, Amiga)

Modems:	300, 1200, 2400, 9600, 14.4K, 28.8K, 33.6K and 57.6K
Baud Rates:	150, 219.84, 269.16, 300, 600, 1200, 2400, 3600, 4800, 7200, 9600, 14.4K, 19.2K, 38.4K, 57.6K, 115.2K, 230.4K
Jumpers:	I/O Page ($DF/$DE), Interrupts: NMI/IRQ, DSR Enable/Disable
Connector:	DB-9 Male (AT-style)

Turbo232 (Includes Novaterm 9.6 Lite) $39.95
Modem Cable (DB9-25) $9.95
Turbo232 w/Novaterm 9.6 $65.00
Turbo w/Modem 33.6 & Cable $[illegible]
Turbo w/Modem 33.6

CMD

To order call:
1-800-638-3263
(M-F, 9a.m.-5p.m. EST)

http://www.oldgamesitalia.net/
http://www.oldgamesitalia.net/